

THE MEDITERRANEAN CRUCIBLE, 1942-1943:  
DID TECHNOLOGY OR TENETS ACHIEVE AIR SUPERIORITY?

BY

FRANCOIS H. ROY II, Major, USAF

A THESIS PRESENTED TO THE FACULTY OF  
THE SCHOOL OF ADVANCED AIR AND SPACE STUDIES  
FOR COMPLETION OF GRADUATION REQUIREMENTS

SCHOOL OF ADVANCED AIR AND SPACE STUDIES

AIR UNIVERSITY

MAXWELL AIR FORCE BASE, ALABAMA

JUNE 2012

**APPROVAL**

The undersigned certify that this thesis meets master's-level standards of research, argumentation, and expression.

---

Dr. JAMES M. TUCCI

---

Dr. RICHARD R. MULLER



## **DISCLAIMER**

The conclusions and opinions expressed in this document are those of the author. They do not reflect the official position of the US Government, Department of Defense, the United States Air Force, or Air University. In accordance with Air Force Instruction 51-303, it is not copyrighted, but is the property of the United States government.

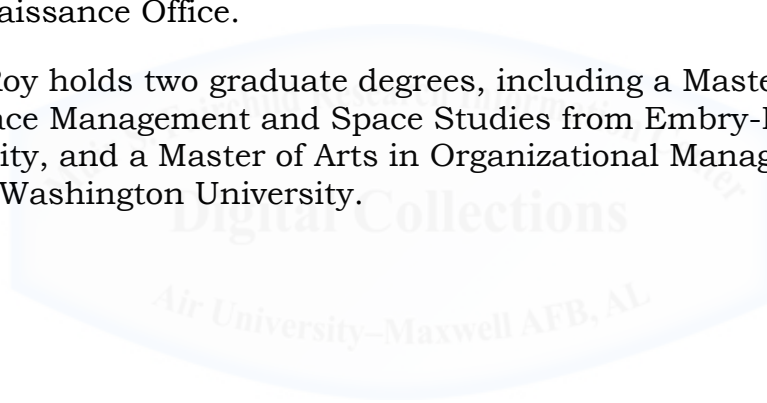


## **ABOUT THE AUTHOR**

Major Francois H. Roy II received his commission through Officer Training School in 1997 and has served in various space and missile operations positions to include missile combat crew commander, instructor, evaluator, operations flight commander, group executive officer, and operations officer. His operational experience includes missile combat crew time in the Minuteman Intercontinental Ballistic Missile System, space control, satellite command and control for the Milstar communication satellite and classified space operations for the National Reconnaissance Office.

In addition to his operational experience, Major Roy was selected for the Air Force Intern Program in 2004 where he served in the Pentagon working space protection for the Department of Defense in the National Security Space Office and on the staff for the Director, National Reconnaissance Office.

Major Roy holds two graduate degrees, including a Master of Science in Aerospace Management and Space Studies from Embry-Riddle University, and a Master of Arts in Organizational Management from The George Washington University.





## **ACKNOWLEDGMENTS**

I am deeply grateful to the faculty, staff, and students at the School of Advanced Air and Space Studies for their investment of time and energy in pursuit of higher learning. Through seminar discussions and faculty lectures, my colleagues and professors have deepened my understanding of and appreciation for the art and science of strategy.

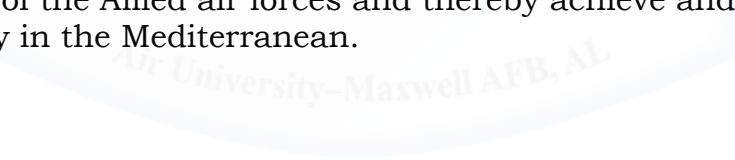
I could not have completed this thesis without the endless support and guidance of my research advisor Dr. James Tucci and the other outstanding scholars at the School of Advanced Air and Space Studies. Dr. Tucci always took the time to answer a question, share a perspective, or provide much needed and timely guidance. His continued encouragement was extraordinary. Additionally, I would like to thank Dr. Richard Muller, my reader, for his wealth of knowledge and expertise and Dr. Alex Roland for starting me on the path of the amateur military historian. The critical reviews and comments from each of these gentlemen have significantly contributed to the balance and depth of the research that follows.

The staff at the Air Force Historical Research Agency was immensely helpful in locating documents and studies specific to this study. For their unwavering assistance, I am extremely grateful.

I must give thanks to the LORD who has given me the strength to endure. For it is God who arms me with strength and keeps my way secure—2 Samuel 22:33. I am also indebted to my beautiful wife and our children who demonstrated tremendous patience and understanding during the past year. Special thanks to my wife who was a great source of encouragement and displayed remarkable selflessness in proofreading and questioning the clarity of my writing.

## ABSTRACT

In Richard J. Overy's air power history *The Air War, 1939-1945*, he makes an unexpected claim for the way in which the Allies won air superiority over the Axis powers in the Mediterranean in the Second World War. Unlike the traditional analyses, which often stress the quality and quantity of aircraft and airmen as the determining arbiters of air superiority, Overy claims that air superiority was achieved through the employment of radar and intelligence. By means of a historical analysis of the first two major US operations in the Mediterranean theater, Operation TORCH (November 1942 - May 1943) and Operation HUSKY (July 1943 - September 1943), the author examines the role of air superiority and how it was obtained by the British Royal Air Force and United States Army Air Forces in a coalition of Allied air powers. More specifically, the author investigates how the Allied forces employed the technology of radar, and the collection and application of intelligence, to defeat the Axis air forces and gain air superiority in the Mediterranean Theater of Operations between 1942 and 1943. The author concludes that technology and intelligence served as enablers to the centralized control of air power that informed Allied strategy and operational plans. Aided by technology, air planners and senior air leaders were able to make informed decisions regarding the allocation for the limited resources of the Allied air forces and thereby achieve and maintain air superiority in the Mediterranean.



## CONTENTS

### Chapter

APPROVAL.....	i
DISCLAIMER .....	ii
ABOUT THE AUTHOR .....	iii
ACKNOWLEDGMENTS.....	iv
ABSTRACT.....	v
INTRODUCTION .....	1
1 RADAR AND AIR INTELLIGENCE.....	20
2 NORTHWEST AFRICA AND OPERATION TORCH.....	33
3 TUNISIAN CAMPAIGN AND OPERATION HUSKY .....	58
4 ANALYSIS.....	79
5 CONCLUSION AND IMPLICATIONS.....	92
ACRONYMS.....	99
BIBLIOGRAPHY .....	101

## Illustrations

Figure 1. Map of the Mediterranean Basin.....	6
Figure 2. Map of Mediterranean Theater of Operations, 1942-1945.....	38
Figure 3. Mediterranean Air Command, February 1943 .....	54
Figure 4. Map of Sicily, Pantelleria, and Malta.....	66
Figure 5. Comparison of Sortie Loss Rate (22 Nov – 26 Dec 1942).....	81



## **Introduction**

### **The Problem and its Setting**

*Air power is indivisible. If you split it up into compartments, you merely pull it to pieces and destroy its greatest asset, its flexibility.*

*If we lose the war in the air, we lose the war and lose it quickly.*

— Field Marshal Montgomery

In Richard J. Overy's air power history, *The Air War, 1939-1945*, the author makes an unexpected claim for the way in which the Allies won air superiority over the Axis powers in the Mediterranean in the Second World War. He writes, "unlike any other air force the RAF was able to achieve air superiority through the use of communications and radar and the prompt and flexible dissemination of intelligence."<sup>1</sup> This interpretation departs from traditional analyses of air superiority, which often cite the quality and quantity of aircraft and airmen as the reasons for Allied air superiority. It is often observed by historians "that the side in the conflict that possessed the best aircraft momentarily commanded the sky."<sup>2</sup>

This paper will focus specifically on air superiority and how it was obtained by the British Royal Air Force (RAF) and United States Army Air Forces (AAF) in a combined coalition of Allied air powers against the Axis air forces—the German *Luftwaffe* and Italian *Regia Aeronautica*. To evaluate Overy's claims, this paper will investigate how the Allied forces employed the technology of radar and how they collected and applied intelligence to defeat the Axis air forces and gain air superiority in the Mediterranean Theater of Operations (MTO) between 1942 and 1943.

---

<sup>1</sup> Richard J. Overy, *The Air War, 1939-1945* (Washington, DC: Potomac Books Inc., 2005), 67.

<sup>2</sup> Leonard Baker and Benjamin F. Cooling, "Developments and Lessons before World War II", in *Case Studies in the Achievement of Air Superiority*, ed. Benjamin F. Cooling (Washington, DC: Air Force History & Museums Program, 1994), 3.

## Literature Review

There are numerous studies of the Allied campaigns in the Mediterranean theater. Wesley Frank Craven and James Lea Cate have written the seminal study on the participation of the AAF in World War II. In *The Army Air Forces in World War II, Volume I, Plans and Early Operations, January 1939 to August 1942*, Craven and Cate detail the politics, strategy, and preparation for what was to be the AAF's first combat operation in World War II. In *The Army Air Forces in World War II, Volume II, Europe: TORCH to POINTBLANK, August 1942 to December 1943*, the story continues with an extensive study specific to the North African and Italian campaigns of the Allied forces. These books are excellent sources to obtain an overall assessment of the contribution made by the AAF during World War II. Denis Richards and Hilary St. George Saunders provide a detailed account of the British World War II strategy, to include both political and military considerations for the RAF's war-time endeavors in *Royal Air Force 1939-1945, Volume II: The Fight Avails*. I.S.O. Playfair in *The Mediterranean and the Middle East, Volume IV*, also makes a significant contribution to the understanding of the British and American efforts in this theater from September 1942 – May 1943 with the capture of Tunisia. Douglas Porch argues the importance of the Mediterranean Theater as a strategic set piece in *The Path to Victory: the Mediterranean Theater in World War II* (2004). In this work, he asserts that the Mediterranean linked a global war through the protection of scarce Allied lines of communication and served not only as training ground for Allied air power doctrine, but also as a conduit for weakening the Axis military machine prior to a cross-Channel invasion in 1944.

AAF involvement in the Mediterranean is documented in several Air Force histories of the Twelfth and Ninth Air Forces maintained at the Air Force Historical Research Agency (AFHRA). These primary sources provide context for the Allied air and ground campaigns in the

Mediterranean, the reorganization of Allied air forces, and more importantly, operational details and air plans for Operations TORCH and HUSKY. For the British perspective of Operation HUSKY, *The Sicilian Campaign, June-August 1943*, also maintained at AFHRA, provides the RAF view of Allied air operations.

For an understanding of the impact of intelligence on the war effort, *Piercing the Fog: Intelligence and Army Air Forces Operations in World War II* (1996), edited by John F. Kreis, provides a comprehensive account of the development of the Army Air Forces' intelligence organization and the exploitation of intelligence networks, sources, and ciphers. For information specific to the development of the British intelligence organization, as well as the exploitation of low-grade signals intelligence and decryption of high-grade ULTRA messages, F.H. Hinsley offers an insightful narrative in the three-volume official work *British Intelligence in the Second World War: Its influence on Strategy and Operations* (1979). John Kreis writes that "*British Intelligence* is likely to remain the standard work on [the titled] subject for both the depth and the breadth of its information."<sup>3</sup> Additional primary sources include a report by Group Captain R. H. Humphreys, "The Use of 'U' in the Mediterranean and Northwest African Theatres of War, Oct 1945", as well as various intelligence summaries prepared by the intelligence section of the AAF.

Louis Brown and Robert Buderer provide a history of radar and in the Second World War and a perspective on the influence of the technology of radar on air operations, respectively. In *The Signal Corps: The Test*, George Raynor Thompson, et al. documents the advancement and employment of radar in North Africa at the operational and tactical level.

---

<sup>3</sup> John F. Kreis ed., *Piercing the Fog: Intelligence and Army Air Forces Operations in World War II* (Washington, DC: Air Force Historical Studies Office, 1996), 472.

## Overview of Chapters

After an introduction to the Mediterranean theater, this paper then tackles a discussion of the technologies that influenced the application of radar and the intelligence apparatus as employed in the MTO. The RAF's experience in the Battle of Britain illustrated the importance and value of radar not only in defense, but also in directing responding pursuit aircraft in engagement with the enemy air forces. Air Marshal Hugh Dowding had the foresight to cultivate an integrated air defensive network of early warning, antiaircraft artillery, and pursuit fighters. Air defense in Britain was revolutionized by integrating two technological developments—radar and command and control. Radar delivered an effective means to predict aircraft position in relation to direction and height and, when combined with an integrated command and control, resulted in a system that consistently proved its worth in the Battle of Britain.<sup>4</sup> Augmenting Air Marshal Dowding's integrated defensive scheme was intelligence gleaned from the deciphered messages of critical *Luftwaffe* communications. The decryption, analysis, and dissemination of messages from the German Enigma coding machine, facilitated the ability to “read the *Luftwaffe* [Enigma] keys in North Africa from the first day of their introduction” in the theater.<sup>5</sup> This system, code-named ULTRA, provided insight into the German high command's strategic communications. The British utilized this system to great effect in the Western Desert Air Force, but failed to incorporate it in early stages of Operation TORCH in the North African desert.

Chapter 3 discusses the initial employment of air power by the AAFs Twelfth Air Force and the RAF's Eastern Air Command in North Africa in Operation TORCH and the difficulties encountered in supporting ground operations, command and control issues, and the

---

<sup>4</sup> Stephen Bungay, *The Most Dangerous Enemy: A History of the Battle of Britain* (London: Aurum Press, 2009), 61-69.

<sup>5</sup> R.A. Ratcliff, *Delusions of Intelligence: Enigma, Ultra, and the End of Secure Ciphers* (New York: Cambridge University Press, 2006), 3.



ensuing reorganization of all air forces in the Mediterranean. Chapter 4 focuses on the Allied invasion of Sicily, the strategic implications, and the role of technology to support the Allied air force. Chapter 5 analyzes the effectiveness of the air campaign in the Mediterranean theater by exploring the determinants that supported the achievement of air superiority in the Mediterranean. In the end, to determine if Overy's analysis is correct, this thesis will evaluate the effectiveness of technology (in the form of radar and intelligence gained from the ULTRA system) and its role in achieving Allied air superiority.

### **The Mediterranean: Strategic Implications**

The strategic implications of the Mediterranean theater were complex with many nuances at play among the Allied partners. In particular, the Mediterranean held both military and economic value for the Allies. The history of the Allied air forces in the Mediterranean theater during World War II began shortly after Italy declared war on the Allies on 10 June 1940. The Royal Air Force (RAF) played the chief role in the opening air campaigns in this theater. The Air Officer Commanding-in-Chief (AOC-in-C) for the Mediterranean was responsible for all RAF units in Egypt, Sudan, Palestine, Trans-Jordan, East Africa, Aden and Somaliland, Iraq, Cyprus, Turkey, the Balkans, Greece, the Mediterranean, the Red Sea and the Persian Gulf—an area of more than 4.5 million square miles (Figure 1).<sup>6</sup> This vast region was the shortest route between Great Britain and Allied bases in Asia, via the Suez Canal, making it a vital military and economic logistic thoroughfare.

---

<sup>6</sup> Arthur Tedder, *With Prejudice: The War Memoirs of Marshal of the Royal Air Force, Lord Tedder* (London: Cassell & Company Ltd, 1966), 29.



**Figure 1. Map of the Mediterranean Basin**

Source: United States Military Academy, History Department

To defend this enormous region, the RAF at this time consisted of 29 squadrons, to include 14 bomber squadrons and 7 fighter squadrons, for a grand total of 300 aircraft.<sup>7</sup> The Italian Air Force (IAF), *Regia Aeronautica*, possessed 480 combat aircraft in Italy proper, Libya, Italian East Africa and the Dodecanese (Greek islands in the Aegean Sea). The bulk of the IAF assets were concentrated in Libya with the ability to call up additional reinforcements from home-based squadrons, as well as from Sicily and along southern France.<sup>8</sup>

British strategy for the war against the Axis forces in 1940 was based on the initial assumption that there were sufficient forces based at

<sup>7</sup> Robert Jackson, *The RAF in Action: From Flanders to the Falklands* (Poole, Dorset: Littlehampton Book Services Ltd, 1985), 72.

<sup>8</sup> Jackson, *RAF in Action*, 72.

home to withstand an attack from Germany on the British Isles proper. From a broader strategic perspective, however, “The main immediate concern of the British was in the Middle East. They regarded an attack on Egypt, possibly from Libya, as imminent, and [took action to reinforce] their garrisons in the Middle East to meet [that threat]. . . . To hold the Middle East was vital to their long-range plans for defeating Germany. These plans called for bombarding and blockading Germany, especially with the hope of creating an acute shortage of oil. [Nonetheless] their chief objective [in 1940] was the elimination of Italy from the war.”<sup>9</sup>

The Mediterranean theater thus played an important role in British World War II strategy after the fall of France and the evacuation of British expeditions from France and Norway. Besides the all-important shipping lanes connecting the Atlantic to the Indian Ocean, it was the only area, other than the British Isles, from which the Western Allies could approach the German-controlled European continent. The possession of North Africa (Morocco, Algeria, Libya, and Egypt) was necessary for the control of the Mediterranean, the vital Suez Canal, and the oil routes from the Middle East. The only location where British forces were still in contact with Axis troops was in North Africa, where the Italians in Libya faced off against the British forces in Egypt.

At a planning meeting in September 1940, the British Chief of Air Staff, Air Chief Marshal Cyril L. Newall, stated that the British regarded “the elimination of Italy as a strategic aim of the first importance. The collapse of Italy would largely relieve the threat to the Middle East and free our hands at sea to meet the Japanese threat, while at the same time increasing the effectiveness of the blockade against Germany.”<sup>10</sup>

To be sure, the main aim of British strategy was the defeat of Germany, but the elimination of Italy as an Axis ally was crucial to this

---

<sup>9</sup> Maurice Matloff and Edwin M. Snell, *Strategic Planning for Coalition Warfare: 1941-1942* (Washington, DC: Center of Military History, 1991), 23.

<sup>10</sup> Matloff and Snell, *Strategic Planning for Coalition Warfare: 1941-1942*, 23.

overall goal. The British feared that the Germans would use Italian bases in Africa to occupy French North and West Africa, putting additional strain on already underdeveloped defenses. The complexity of the overall strategic dilemma in the region is brought to the forefront by Newall, "Although Italy is our declared enemy and other Nations, such as Spain, may be dragged into the war at Germany's heels. Germany is the mainspring of enemy effort. Whatever action may be necessary against any other country must, therefore, be related to our main object, which is the defeat of Germany."<sup>11</sup> Regardless of whether the focus of the war effort was against Italian or German forces in the Mediterranean, the first priority for the Allied forces was to gain air superiority over the Axis air forces.

### **Air Superiority Definition and Doctrine**

To understand the role of air power in the MTO, it is important to understand how air power advocates and practitioners of air power defined air superiority. Pre-war doctrine and air war planning for the employment of AAF and RAF airpower focused on strategic bombing of industrial targets. As such, both air forces were initially organized around a fleet of light, medium and heavy bombers, while the air missions of pursuit and escort took a subordinate role. The AAF planners "relying on speed, massed formations, high altitude, defensive firepower and armor, and simultaneous penetrations at many places" argued that air superiority and ultimate victory would be achieved by bombers.<sup>12</sup> Air superiority doctrine evolved however, as the importance of pursuit aviation became more widely recognized as crucial to the combined arms effort. Airmen understood that the "achievement of air

---

<sup>11</sup> Matloff and Snell, *Strategic Planning for Coalition Warfare: 1941-1942*, 23.

<sup>12</sup> Robert Frank Futrell, *Ideas, Concepts, Doctrine: A History of Basic Thinking in the United States Air Force, 1907-1960* (Montgomery, AL: Air University Press, 1989), 110; Baker and Cooling, *Developments and Lessons*, 52.

superiority *over* the battlefield was obviously an extension of superiority *on* the battlefield” (emphasis added).<sup>13</sup>

British and American airmen advocated centralized command of all air assets by the air commander, while most ground commanders believed that they should control ground support aircraft to prevent airmen from tasking these aircraft with other missions.<sup>14</sup> As the North African campaign grew in scope, Allied planners had to adjust their doctrinal mind-set and adopt command and control procedures for the integration of all aircraft. In contrast to the European theater, the Mediterranean theater had few strategic industrial targets for airmen to engage. What it did have were vital transportation centers, especially ports, which could be effectively targeted by Allied bombers. Airpower in the Mediterranean had four primary tasks: 1) destroy the enemy’s weapons and air forces before they could be used against allied forces, 2) provide tactical assistance to ground forces in battle, 3) keep sea lanes open, and to protect shipping and harbors, and 4) support partisan efforts in the Balkans and Northern Italy.<sup>15</sup> Airmen developed air plans in support of winning air superiority, interdiction, close air support, and strategic bombing, not only in North Africa, but also in the central Mediterranean.<sup>16</sup>

Air power doctrine in the interwar years was shaped primarily by support *to* instead of cooperation *with* the ground commander. Field Manual (FM) 1-5, *Employment of Aviation of the Army* (1940), assigned responsibility for determining the objectives for any air offensive to the field commander, while the air force commander served a dual function as commander and staff officer. He had responsibility for all Air Corps

---

<sup>13</sup> Baker and Cooling, *Developments and Lessons*, 5.

<sup>14</sup> Daniel R. Mortensen, *Pattern for Joint Operations: World War II Close Air Support, North Africa* (Washington, DC: Office of Air Force History and U.S. Army Center of Military History, 1987), 23-24.

<sup>15</sup> Headquarters Twelfth Air Force, Field Order 1, 15 October 1942, Annex 2, HRA Call no. 520.2132, IRIS no. 219497, in USAF Collection, AFHRA.

<sup>16</sup> David Syrett, “North Africa, 1942-1943”, in *Case Studies in the Achievement of Air Superiority*, ed. Benjamin F. Cooling (Washington, DC: Air Force History & Museums Program, 1994), 225.

operations as the commander of air forces, and he served as an air support advisor and staff officer to the Army command. In this role, he provided advice on aviation capabilities and recommendations for the effective employment of aviation in support of ground forces.<sup>17</sup>

Influenced by Air War Plans Division-1 (AWPD-1), which focused on the defense of the Western Hemisphere as the primary objective, FM 1-5 did not emphasize air as an independently offensive weapon. It did, however, identify specific procedures and requirements for close air support, maritime operations, and air interdiction missions, which would become cornerstones of the Mediterranean strategy.<sup>18</sup> Within FM 1-5, air superiority was defined as “complete control of the air” and could “be gained and maintained only by total destruction of the enemy's aviation.”<sup>19</sup>

AWPD-42, published in October 1942, defined air ascendancy as “the condition of air strength, both of ourselves and of the enemy, under which it will be possible for our several armed forces to complete the defeat of our enemies.”<sup>20</sup> AWPD-42 stipulated to achieve air ascendancy the following conditions must be met: “1) the enemy strength must be so depleted as to render him incapable of frustrating the operations of our air, land, and sea forces; and 2) our own air strength must be so developed as to permit us to carry out the roles of our own air force, in conjunction with our land and sea forces and also independently thereof, which are necessary for the defeat of our enemies.”<sup>21</sup>

British doctrine devoted a major section to air superiority in *The Employment of the Air Forces with the Army in the Field* (1938). The British definition of air superiority as “a state of moral and material

---

<sup>17</sup> War Department Basic Field Manual (FM) 1-5, *Employment of Aviation of the Army*, HRA Call no. 170.121001-5, IRIS no. 1076849, in USAF Collection, AFHRA, 7.

<sup>18</sup> FM 1-5, *Employment of Aviation of the Army*; 13, 21-27.

<sup>19</sup> FM 1-5, *Employment of Aviation of the Army*; 9.

<sup>20</sup> Air War Plans Division-42 (AWPD-42), Requirements for Air Ascendancy, October 17, 1942, HRA Call no. 145.82-42, IRIS no. 118168, in USAF Collection, AFHRA, Part IV, 1.

<sup>21</sup> AWPD-42, Part IV, 1.



superiority which enables its possessor to conduct air operations against an enemy and at the same time deprives the enemy of the ability to interfere effectively by the use of his own air forces” would later serve as the basis for all Allied doctrine on the role of air superiority.<sup>22</sup> Air Marshal Tedder argued that there is “no rule-of-thumb solution to the problem of securing air superiority, no simple formula. . . . There is nothing absolute about air superiority—so long as the enemy can operate any aircraft.”<sup>23</sup> I.B. Holley asserted in *Case Studies in the Achievement of Air Superiority* that setting the conditions for air superiority permits the “freedom for a nation’s air forces to operate at will over chosen portions of enemy territory. Air supremacy, by contrast, is that situation in which a nation’s air arm has achieved superiority virtually everywhere and is free to operate substantially unhindered by enemy air activity.”<sup>24</sup>

Airmen have always asserted that air power is “best employed as a consolidated force in pursuit of theater objectives under the control of a single air commander.”<sup>25</sup> In the interwar period J.C. Slessor cautioned that air power should not be employed piecemeal. The tenets of air power should be viewed in unity and as such, demanded unity of command. He even cautioned that a failure to exercise centralized control of air power would result in dispersal of valuable assets and wasted effort.<sup>26</sup> Yet, FM 31-35, *Aviation in Support of Ground Forces* (1942), published as a joint ground and air manual defining air support, subordinated the role of the air force to the requirements of the ground force commander. This manual stated that “The ground force commander, in collaboration with the air support commander, [will

---

<sup>22</sup> Baker and Cooling, *Developments and Lessons*, 52.

<sup>23</sup> Arthur W. Tedder, *Air Power in War*, paperback ed. (Tuscaloosa: University Alabama Press, 2010), 39.

<sup>24</sup> I.B. Holley, Jr., “Some Concluding Insights”, in *Case Studies in the Achievement of Air Superiority*, ed. Benjamin F. Cooling (Washington, DC: Air Force History & Museums Program, 1994), 610.

<sup>25</sup> Thomas E. Griffith, Jr. *Macarthur's Airman: General George C. Kenney and the War in the Southwest Pacific* (Lawrence, KS: University Press of Kansas, 1998), 232.

<sup>26</sup> J.C. Slessor, *Air Power and Armies* (Tuscaloosa: University Alabama Press, 2009), 91.

decide] the air support required”<sup>27</sup> and “[t]he decision as to whether or not an air support mission will be ordered rests with the commander of the supported unit.”<sup>28</sup>

The Allies entered the war with doctrine bestowing upon the supported ground commander control of the air assets assigned to support ground operations, while devaluing the mission of gaining and maintaining air superiority. The Mediterranean theater of operations would identify the inefficiency of this doctrine and, integrating concepts from proven tactics in the Western Desert campaign, would eventually meld the air and ground forces into an effective team, posturing the Allied air forces for the efficient employment of air power so crucial for gaining air superiority in the Allied invasion at Normandy in Operation OVERLORD.



---

<sup>27</sup> War Department Basic Field Manual (FM) 31-35, *Aviation in Support of Ground Forces*, 9 April 1942, HRA Call no. 170.121031-35, IRIS no. 127700, in USAF Collection, AFHRA, 6.

<sup>28</sup> FM 31-35, *Aviation in Support of Ground Forces*, 13.



## Allied Aid in the Mediterranean

In September of 1940, in an attempt to secure his position in the Mediterranean and “demonstrate his equality and independence” from Germany, Benito Mussolini pursued a failed attempt to invade and capture Egypt. Again in October 1940, he also unsuccessfully pursued an invasion of Greece.<sup>29</sup> Greece, bolstered by British air and sea forces, dispatched the Italian invaders and in the process humiliated Mussolini and infuriated Hitler. The blunders by Mussolini forced Hitler to reconsider his “hands-off policy in the Mediterranean.”<sup>30</sup> Hitler feared for the security of the Romanian oil fields if Britain secured Greece as a forward air base.<sup>31</sup> Operational units from *Luftwaffe Fliegerkorps X*, under the command of General der Flieger Giesler, arrived in Sicily in January 1941 with the intent of strengthening the IAF. The RAF, forced to split forces between the defense of Egypt and Greece, was outnumbered by the *Luftwaffe* by as much as 10 to 1. By 14 April 1941, Britain once again prepared for “another Dunkirk, this time in Greece.”<sup>32</sup> With British forces forced to evacuate to Crete, Greece no longer could hold off the Axis invasion and surrendered to German forces on 21 April 1941. The Allies had lost a critical foothold in the Mediterranean.<sup>33</sup>

In February 1941, after a series of stunning British victories in the Western Desert of Libya, Hitler was once again forced to come to the aid of the Italians. The Italians were reinforced on the ground by the *Afrika Korps* under Lieutenant General Erwin Rommel and supported in the air by *Fliegerkorps X*.<sup>34</sup> In December 1941, with the German situation worsening in North Africa, General Field Marshal Albert Kesselring and

---

<sup>29</sup> Douglas Porch, *The Path to Victory: the Mediterranean Theater in World War II* (New York: Farrar, Straus and Giroux, 2004), 99.

<sup>30</sup> Porch, *Path to Victory*, 96.

<sup>31</sup> Porch, *Path to Victory*, 149.

<sup>32</sup> Porch, *Path to Victory*, 154.

<sup>33</sup> Porch, *Path to Victory*, 154.

<sup>34</sup> H.A. Probert, *The Rise and Fall of the German Air Force, 1933-1945* (London: Arms & Armour, 1987), 126.

*Luftflotte 2* was transferred to Sicily from the central Russia to take command of the air operations for the Mediterranean theater. *Luftflotte 2* included *Fliegerkorps II* with responsibility for Central Mediterranean, and *Fliegerkorps X* with responsibility for the Eastern Mediterranean.<sup>35</sup> The British Western Desert Air Force (WDAF) and the Eighth Army would be engaged in a see-saw battle for control of North Africa (El Alamein, Egypt to Tripoli, Libya) against the Axis forces for the remainder of 1941.

American support for the war effort in the Mediterranean began long before their entry to the war—primarily via material to support the British air forces under President Roosevelt’s Lend-Lease program. As early as November 1938, President Roosevelt stated publicly “that airplanes—not ground forces—were the implements of war that would influence Hitler's actions.”<sup>36</sup> America’s role at the outset of the Allied conflict against the Axis powers of Germany and Italy was one of transition. “By successive stages the nation made the transition from the status of major supplier of the ‘arsenal of democracy’ to outright military collaboration with Great Britain”.<sup>37</sup> Even with the Japanese attack at Pearl Harbor on 7 December 1941 and the declaration of war on the United States by the Germans and Italians four days later, planning in earnest for American forces’ contribution to the Allied efforts in the Mediterranean would not begin until mid-1942.

### **Planning for Operation TORCH**

Initially, American war planners were opposed to opening a front in the Mediterranean. The American British Conversation agreement (ABC-1) of 30 March 1941 set forth Germany as the primary objective with the secondary objective of a defensive holding action against Japan until Germany was defeated. Roosevelt, however, was convinced that the

---

<sup>35</sup> Probert, *Rise and Fall of the German Air Force*, 133.

<sup>36</sup> Futrell, *Ideas, Concepts, Doctrine*, 91.

<sup>37</sup> Maurice Matloff, *Strategic Planning for Coalition Warfare: 1943-1944*, (Washington, DC: Center of Military History, United States Army, 1991), 5.

Mediterranean was a theater where America could make its presence known immediately. In *The Path to Victory: the Mediterranean Theater in World War II*, Douglas Porch contends that “strategically the British, and ultimately the Americans, had little to lose by fighting [in the Mediterranean], and much to gain. This made the Mediterranean, especially the Eastern Mediterranean, the perfect battlefield. Defeat in the Mediterranean would probably not mean the defeat of Britain, while victory there would sustain morale, undermine Italy, encourage American aid, overextend Axis forces, protect Middle Eastern oilfields, draw the French back into the war, [and] keep Spain on the sidelines.”<sup>38</sup>

Operation TORCH, commanded by Lieutenant General Dwight D. Eisenhower, consisted of three task forces under United States and British command. To support these task forces, Major General Carl Spaatz, commander of the Eighth Air Force, was directed to organize, train, and equip a new air force. This air force drew heavily on and was primarily outfitted with Eighth Air Force units to support the first allied coalition operation. This new air force, designated as the Twelfth Air Force, under the overall command of Brigadier General James H. Doolittle, was divided into the two air arms of the Western Air Command. Colonel Lauris Norstad would lead one air arm supporting the Western Task Force, commanded by Major General George S. Patton (American Fifth Army), and Brigadier General John K. Cannon would lead the second air arm supporting the Center Task Force, commanded by Major General Lloyd R. Fredendall. By dividing the Twelfth Air Force into two parts, the two sections of the air force were separated by 365 miles. Couple this with the reluctance of the individual task force commanders “to give up command of *their* air assets” prevented the Twelfth from being utilized in a coordinated and concentrated manner.<sup>39</sup> (emphasis added)

---

<sup>38</sup> Porch, *Path to Victory*, 7.

<sup>39</sup> Richard G. Davis, *Carl A. Spaatz and the Air War in Europe* (Center of Air Force History: Washington, DC, 1993), 124.

The Eastern Task Force, commanded by Major General Charles W. Ryder until the capture of Algiers, then subsequently by Lieutenant General Kenneth A.N. Anderson (British First Army), would be supported by the RAF's Eastern Air Command, under command of Air Marshall William L. Welsh.<sup>40</sup> This arrangement led British and American air forces to operate separately and in different geographical areas for Operation TORCH.

Twelfth Air Force arrived in North Africa as an inexperienced and hastily organized unit. The unit consisted of two heavy bomb groups, two groups of P-38 Lightning pursuit aircraft, two Spitfire fighter groups, three medium bomb groups, one light bomb group, and one transport group.<sup>41</sup> The pursuit (fighter) aircraft were tasked with sweeping enemy aircraft from the skies over the desert and providing close air support to allied forces on the ground. The long-range American heavy bombers were utilized as the ideal weapon to strike the vulnerable logistic networks that the Axis armies relied on for their supplies.

The air forces supporting the Allied invasion of North Africa had little time to train and prepare for the unique support that would be required during Operation TORCH. The Twelfth Air Force and Eastern Air Command both suffered from organizational issues resulting from the haphazard manner in which units were drawn from other forces and operational fronts.<sup>42</sup> As a result, the extensive experience gained by the WDAF in cooperation with the British Eighth Army against the *Luftwaffe* and the *Afrika Korps* in Egypt and Libya, as well as the tactics, techniques and procedures for the effective employment of air power, was not implemented within the forces assigned to assault North Africa. The

---

<sup>40</sup> Monro MacCloskey, *TORCH and the Twelfth Air Force* (New York: Richards Rosen Press, 1971), 45-46; George F. Howe, *Northwest Africa: Seizing the Initiative in the West* (Washington, DC: Center Of Military History, 1993), 37.

<sup>41</sup> Wesley Frank Craven and James Cate, eds., *The Army Air Forces in World War II. Vol. II, Europe: TORCH to POINTBLANK*, (New York: University of Chicago Press, 1950), 51-52.

<sup>42</sup> Carlo D'Este, *World War II in the Mediterranean, 1942-1945* (Chapel Hill, NC: Algonquin Books of Chapel Hill, 1990), 10.

Allied air forces assigned to Operation TORCH lacked the requisite “command and control, air organization, and the lack of aerial resources. . . . Further, an effective doctrine of air power in support of ground operations had to be clearly delineated. The acquisition of air superiority in North Africa was dependent upon all this.”<sup>43</sup> At the outset of operations in the Mediterranean, the Western Air Command (Twelfth Air Force) and the Eastern Air Command were essentially two separate air forces with distinct missions.<sup>44</sup> Before the Allies could carry out the destruction and force the capitulation of the Axis, these issues had to be resolved. The battle for North Africa would test AAF and RAF doctrine and emphasize the importance of centralized command of air forces.

Among other shortcomings in air planning, the Allied air forces would soon realize the importance of all-weather airfields on which to base their air assets. “North Africa, in the winter of 1942-1943, proved an unforgiving locale for the conduct of air operations.”<sup>45</sup> By controlling the four all-weather hard-surface airfields in the Tunisian plain, the *Luftwaffe* had a distinct advantage and was able to operate with virtual impunity. The nearest Allied all-weather airfield to support operations in the critical front in Tunisia was east of Algiers at Bône, “over 120 miles from the front lines.”<sup>46</sup> The Allied air forces, operating from unimproved dirt fields in the eastern Algerian highlands, discovered that in the rainy season (December 1942 – February 1943) these fields immediately turned into a quagmire of mud.<sup>47</sup> The lack of suitable airfields would continue to plague the Allied Forces until the closing days of Operation TORCH.

---

<sup>43</sup> David Syrett, “North Africa, 1942-1943”, 223.

<sup>44</sup> History of the Twelfth Air Force, Vol. I (Draft), HRA call no. 605.057-3, IRIS no. 245172, in USAF Collection, AFHRA, 16.

<sup>45</sup> Richard G. Davis, *Carl A. Spaatz and the Air War in Europe* (Center of Air Force History: Washington, DC, 1993), 124.

<sup>46</sup> D’Este, *World War II in the Mediterranean*, 9-10.

<sup>47</sup> Davis, *Carl A. Spaatz*, 128.

## **Study Implications**

This work attempts to answer the following questions: What was the role of technology as employed in the Mediterranean Theater, and what was its impact in achieving air superiority? How did technology affect techniques, procedures, and doctrine in order to meet the challenges of coalition operations in the Mediterranean? What are the implications from the lessons learned in the Mediterranean theater towards the achievement of air superiority in the twenty-first century?

The battle for the Mediterranean theater in the Second World War and the contribution of the Allied air forces offers potential lessons for modern day air forces supporting coalition and joint operations. This paper offers recommendations for consideration with regards to this vital strategic location. The unsettled conflicts in Syria, Libya, and Egypt portend larger strategic considerations for the effective application of air power in the Mediterranean.

The North African battlefield was a proving ground for interwar doctrine and a laboratory for air and ground forces to develop and implement an effective means of coordination. As the war in the Mediterranean progressed from a struggle for air superiority in North Africa to an overwhelming defeat of the Axis air forces at Sicily, the Allied forces used the experiences of the Mediterranean theater to transform air doctrine and incorporate and refine technological innovations. The codification of doctrine for the employment of air power under a single air commander, as well as the effective use of radar and intelligence forged the Allied Air Force into a formidable air power. The lessons learned in the Mediterranean would be instrumental in the battles to come on the European continent.

## Chapter 1

### Radar and Air Intelligence

*Intelligence is gathered in order to be used. Intelligence which is not used is of little significance . . . Intelligence is not an end in itself, nor is the means by which it is gathered: both serve a greater end, the securing of political advantage in peacetime or victory over an enemy in war.*

— Ralph Bennett,  
*Intelligence Investigations*

Air operations in the Mediterranean Theater were indebted to lessons learned from the defense of the British Isles in the Battle of Britain. Air Marshal Hugh Dowding, charged with the air defense of Britain, employed essential technologies to cultivate an integrated defensive network of early warning, antiaircraft artillery, and pursuit fighters. Air defense in Britain was revolutionized by the fielding of two technological innovations: radar and an integrated command and control system. Radar provided an effective means to predict aircraft position in relation to direction and height, but when this information was combined with integrated command and control, the result was a system that proved its worth in thwarting the *Luftwaffe* in the fall of 1940.<sup>1</sup> Augmenting Air Marshal Dowding's integrated air defense was intelligence gleaned from the deciphered messages of critical *Luftwaffe* communications. The Battle of Britain was the proving ground for the maturation of processes and procedures in the intelligence network headquartered at Bletchley Park.

The team of academics, scientists, and artists at Bletchley developed a system of decryption, analysis, and dissemination of the German Enigma encoded messages that facilitated the ability to “read the

---

<sup>1</sup> Stephen Bungay, *The Most Dangerous Enemy: A History of the Battle of Britain* (London: Aurum Press, 2009), 61-69.



*Luftwaffe* [Enigma] keys in North Africa” upon their first use in the theater.<sup>2</sup> This system, code-named ULTRA, provided insight into the German high command’s strategic communications. The successful employment of air power in the Mediterranean was influenced by “Weather, force size, developments in the ground war, and logistics . . . , but essential to its success was timely, accurate, and comprehensive intelligence. To obtain this intelligence, air commanders called upon a wide range of capabilities that included photoreconnaissance, agent reports, POW [Prisoner of War] interrogations, aircrew reports, radio intercepts, and ULTRA.”<sup>3</sup>

Effective intelligence demanded more than collection and mere analysis; it also required the ability to apply the information at the strategic and tactical levels of war. This required officers with not only the intellectual prowess, but also a certain degree of experience and intuition to understand the importance of the information to the war effort. As historian and British intelligence officer Ralph Bennett writes, at the outbreak of war in 1940 there was “no means of bridging the gap” between these skill sets. He contends that “Hitler’s mistake in moving his *Schwerpunkt* [focus of effort] from west to east and south-east in 1941-42 gave the British time to acquire the new techniques needed for the purpose [of bridging the gap] and to forge them into a new and sharp weapon of war.”<sup>4</sup>

Contacts with British intelligence were enormously important for the development of American air intelligence. Even before the United States entered the war, the RAF had trained eleven AAF officers in the

---

<sup>2</sup> R.A. Ratcliff, *Delusions of Intelligence: Enigma, Ultra, and the End of Secure Ciphers* (New York: Cambridge University Press, 2006), 3.

<sup>3</sup> Robert C. Ehrhart, Thomas A. Fabyanic, and Robert F. Futrell, “Building an Air Intelligence Organization and the European Theater”, in *Piercing the Fog: Intelligence and Army Air Forces Operations in World War II*, ed. John F. Kreis (Washington, DC: Air Force Historical Studies Office, 1996), 162. Ralph Bennett, *Behind the Battle: Intelligence in the War with Germany, 1939-1945* (London: Pimlico, 1999), 104.

<sup>4</sup> Bennett, *Intelligence Investigations*, 11-12. *Schwerpunkt* is translated as “weight (or focus) of effort”; in Carl von Clausewitz’, *On War* it was translated as “center of gravity”.



techniques of photographic interpretation. Those officers returned to the United States in October 1941 to help in the creation of an American photo reconnaissance effort. Furthermore, the British had agreed in the spring of 1942 to establish a combined office with the Eighth Air Force to interpret all photographic intelligence.<sup>5</sup> This practice of collocated and combined staffs would continue to influence Allied interdependence in North Africa and onward to Sicily. To understand the influence of technology on air superiority, an examination of the individual components of radar and the intelligence apparatus is in order.

### **Radar: Detecting and Defeating the Adversary**

#### *Radar Fundamentals*

**RA**dio **D**etection **A**nd **R**anging, or RADAR, as employed in World War II, was a technique used to determine the position of an object—whether it was a ship or an airplane—by illuminating the target with radio waves, then capturing and observing the return from the reflection off the target. With this technique, the targets' distance, height, direction and even relative speed could be determined.<sup>6</sup>

Robert Alexander Watson-Watt, a Scotsman and superintendent of the Radio Department of the National Physical Laboratory is often credited with the innovation of radar for the use of detecting aircraft in flight.<sup>7</sup> The technology behind radar had its humble beginnings in the early manipulation of radio waves into varying wavelengths and frequencies as a means to improve radio communication. For radar, the wavelength is the primary unit of measurement. It is determined by measuring the distances between the amplitude (height) of two

---

<sup>5</sup> F.H. Hinsley, et al., *British Intelligence in the Second World War*, Vol. II (New York: Cambridge University Press, 1979), 46.

<sup>6</sup> Louis Brown, *A Radar History of World War II: Technical and Military Imperatives* (Washington, DC: Carnegie Institution of Washington, 1999), 466.

<sup>7</sup> Robert Buder, *The Invention that Changed the World: How a Small Group of Radar Pioneers Won the Second World War and Launched a Technological Revolution* (New York: Simon & Schuster, 1998), 54.

successive “crests” of the sine wave as it rises and falls above a center line. The radar wavelength, measured in either meters (m) or centimeters (cm) determines the type and size of objects that can be effectively tracked. The beam of energy transmitted by the radar system could be made narrower with “tighter” wavelengths, leading to the development of the microwave radar. The narrower the beam, the less refraction from the background of the target (typically referred to as background clutter), and so the easier it is for the operator to interpret the radar return. Systems utilizing microwave radars also benefited from increased anti-jamming and the ability to identify smaller targets.<sup>8</sup> The other critical factor in radar is the amount of energy being radiated by the transmitter and is measured in watts (e.g. megawatt (MW), kilowatt (kW), or microwatt  $\mu$ W)).<sup>9</sup>

A radar signal, once transmitted, will lose intensity in proportion to the square of the distance traveled to the object. Likewise, the returning signal is subject to the same phenomenon. Therefore, the reflected signal received by the radar receiver decreases by a fourth power of the distance. “The only reason that radar is possible for any reasonable range . . . is that the transmitter can be made to radiate hundreds of kW and receivers function with a small fraction of a  $\mu$ W.”<sup>10</sup> The manipulation of this signal is what allowed radar operators to track targets of varying sizes and speeds. The equipment associated with radar in World War II included a transmitter/receiver antenna, the radio set that generated the signal, and a workstation that displayed the information in a format for interpretation by the operator; commonly referred to as the plan position indicator (PPI). The display screen would project a “map-like representation of the region interrogated by the

---

<sup>8</sup> Brown, *Radar History of World War II*, 145.

<sup>9</sup> Brown, *Radar History of World War II*, 466-467.

<sup>10</sup> Brown, *Radar History of World War II*, 468.

radar” with each sweep of the radar. The target would be illuminated as a “blip” on the screen.<sup>11</sup>

### *Radar Employment*

The technology of radar was incorporated in various components of the Allied air forces. The initial assault on North Africa would use lightweight radars which men could quickly carry ashore and set up to detect the ingress of enemy air. Once ashore and with airfields secured, early warning radars with long-range capabilities were necessary to relieve British ship-mounted radar established for the initial assault. Finally, the ground control intercept (GCI) radar set was organized to spot enemy bombers and fighters. This capability enabled air defense control officers to direct aerial interdiction (AI) equipped fighter pilots into positions to intercept and shoot down the enemy.<sup>12</sup> Radar was *the* technological component that made the doctrine of air support possible. Richard Davis in his biography of General Spaatz stated that, “Radar coverage allowed the air-support commander to form a quick and accurate picture of the position of his own and of the enemy's frontal aviation. Complete coverage enabled the air commander to divert or abort tactical bomber and reconnaissance flights from enemy fighters and, at the same time, made it possible for him to use friendly fighters either defensively to break up incoming enemy air attacks or offensively to strike enemy aircraft on or over their air fields. This made the centralization of control of air-support forces not only necessary but easier and more effective.”<sup>13</sup>

Allied radar in the Mediterranean in mid-1942 consisted primarily of the long-wave systems. Early systems included the Signal Corps Radio (SCR)-270, SCR-602, and SCR-268 as the backbone of American

---

<sup>11</sup> Brown, *Radar History of World War II*, 475-478.

<sup>12</sup> George Raynor Thompson, et al., *The Signal Corps: The Test* (Washington, DC: U.S. Government Printing Office, 1978), 375-376;

<sup>13</sup> Richard G. Davis, *Carl A. Spaatz and the Air War in Europe* (Center for Air Force History, 1996), 186.

radar technology. The SCR-270 was the very same system being utilized along the coast of the United States and, most infamously, in Hawaii, on 7 December 1941.<sup>14</sup> Along with British Ground Control Intercept (GCI) systems, radar systems were set up in Algiers, Casablanca, and Oran to provide anti-aircraft defenses.

The most widely employed radar system in the Mediterranean, the 1.5m wavelength SCR-268, was used by gun batteries to track aircraft, direct searchlights, and control firing the 90-millimeter (mm) anti-aircraft (AA) guns.<sup>15</sup> “It was compact and mobile and could determine azimuth . . . and elevation for ranges up to 24 miles.”<sup>16</sup> Radar control of the AA was more effective than the use of searchlights, allowing ground forces to employ these radars in automatic modes to defend North African ports and air bases.<sup>17</sup> The lack of more specialized radar systems in the theater drove innovations in the use of the SCR-268 for which it was not designed. Through modifications to the pulse frequency of the transmitter and increases in voltage to the equipment, the range of the -268 was increased to 70 miles in order to provide some degree of early warning for AA forces.<sup>18</sup> The workhorse for the Allied forces in North Africa was the 10cm microwave radar, identified as the SCR-582. The SCR-582, originally intended for harbor defense, was soon employed in an air defense role. The 120cm-diameter-rotating antenna was able to detect low-flying aircraft out to 40 kilometer (km) from the station. In addition to air defense, the highly versatile radar PPI provided operators with the capability of guiding ships into harbors through the minefields, and detecting German torpedo boats—functions that were impossible for the first generation meter wavelength radar systems. Essentially, the AAF had no portable early warning radar at the outbreak of World War II.

---

<sup>14</sup> Thompson, et al., *Signal Corps*, 4.

<sup>15</sup> Henry E. Guerlac, *RADAR in World War II*, Vol. 8 (Los Angeles: Tomash Publishers, 1987), 110.

<sup>16</sup> Thompson, et al., *Signal Corps*, 94.

<sup>17</sup> Brown, *Radar History of World War II*, 354-355.

<sup>18</sup> Guerlac, *RADAR in World War II*, 110.

Thompson et al., writes “The AAF, with its predilection for British long-wave sets, turned . . . to the British LW, or lightweight warning radar which the Signal Corps copied as the SCR-602, in time for use in North Africa.”<sup>19</sup> This system represented the evolution of radar technology as a lightweight, mobile radar. It was classified as an intermediate-wave radar (between long-wave (meter) and microwave) and transmitted a 50cm wavelength.<sup>20</sup>

British and American forces did not have a monopoly on radar capabilities. Germany also employed radar in the Mediterranean in the form of long-wave radars, notably with the *Freya* and the *Würzburg* radar sets. These two radar sets formed the *Himmelbett* systems which utilized the strengths of the individual radar sets to form an early warning and tracking zone that measured 45km long and 22km wide.<sup>21</sup> AAF crews reported that the Germans employed “an effective air warning service with some 15 radar stations, all identified and located in Tunisia, Sicily, and Sardinia.”<sup>22</sup> Twelfth Air Force in particular reported the enemy had “excellent anti-aircraft radar fire control, describing the AA defense . . . as being deadly at 25,000-32,000 ft.”<sup>23</sup> These systems presented a distinct danger to Allied air forces, and after action reports such as these were vital to the piecing together enemy capabilities and the air intelligence picture.

### **Intelligence: Understanding the Enemy**

As 1942 began, one of the most serious obstacles to the development of effective air intelligence in the AAF was an almost total absence of qualified officers and the lack of even a basic training

---

<sup>19</sup> Thompson, et al., *Signal Corps*, 262.

<sup>20</sup> Thompson, et al., *Signal Corps*, 263.

<sup>21</sup> Brown, *Radar History of World War II*, 354, 705.

<sup>22</sup> Guerlac, *RADAR in World War II*, 705.

<sup>23</sup> Guerlac, *RADAR in World War II*, 705.

program.<sup>24</sup> AAF intelligence officers received initial training in the states or at RAF schools and were subsequently integrated into existing British intelligence organizations. This “reliance on the RAF and other British agencies for intelligence would characterize the American air effort in Europe throughout the war, and this was especially true of intelligence in its more fundamental aspects.”<sup>25</sup>

### *Photographic Reconnaissance*

AAF planning for operations in the Mediterranean had been strongly influenced by the amount of information the British were reportedly obtaining from interpretation of aerial photographs. Photographic reconnaissance (photo reconnaissance) was one of the more prolific sources of intelligence used by intelligence officers to provide situational awareness for planners and air crews supporting the air campaign in the Mediterranean.<sup>26</sup> Photo reconnaissance consisted of collection, processing, and interpretation—a failure in one segment resulted in a failure of the entire mission. When the United States officially entered the war, the AAF had very few trained photo interpreters and no indigenous photo intelligence capabilities. Nearly all photo intelligence for the Mediterranean depended, to a large extent, on British Army and RAF personnel for interpretation.<sup>27</sup>

Photo reconnaissance squadrons were tasked with missions over the ports and waterways of the Mediterranean and the airfields of Italy, Sicily, Sardinia, Corsica, and North Africa. In North Africa, these units were tasked on four-hour intervals to identify positions and numbers of

---

<sup>24</sup> Wesley Frank Craven and James Cate, eds., *The Army Air Forces in World War II. Vol. I, Plans and Early Operations*. (New York: University of Chicago Press, 1950), 623; Robert C. Ehrhart et al., “Building an Air Intelligence Organization”, 126.

<sup>25</sup> Craven and Cate, *Plans and Early Operations*, 3.

<sup>26</sup> Interview of Colonel Elliot Roosevelt, AAF, Commanding Officer, Photo Reconnaissance Wing, NAAF, 30 Jul 1943, HRA no. 650.04-1, IRIS no. 245167, in USAF Collection, AFHRA, 11.

<sup>27</sup> Interview of Colonel Elliot Roosevelt, 6.



fighters and bombers at enemy fields. Additional tasking was required to assess targets, battle damage, and enemy ship movements.<sup>28</sup>

Photo reconnaissance units were sent to North Africa with inadequate equipment and insufficient aircraft platforms.<sup>29</sup> In the spring of 1942 the first photo reconnaissance units were established using F-7s (modified B-24s) and F-9s (modified B-17s).<sup>30</sup> The slow, lumbering F-7s and F-9s were no match for German Messerschmitt (Me) 109s in North Africa. Upwards of thirty percent of the original reconnaissance aircraft sent to support Operation TORCH were shot down in the first three months of operations—quickly demonstrating the unsuitability of these platforms for the photo reconnaissance mission.<sup>31</sup> “As a result, in the Mediterranean theater—where speed, maneuverability, and constant vigilance were the reconnaissance pilot's best defenses—the F-4 (P-38E) and variations of the F-5 (P-38G/H) became the primary AAF reconnaissance aircraft.”<sup>32</sup> AAF photo reconnaissance operations also suffered from a 9-percent mission loss rate due to camera failure. In contrast, British forces operating with superior equipment lost only one tenth of a percent of reconnaissance due to camera failure.<sup>33</sup> “Despite improvements made in later versions of the F-5, they remained less capable than the British Mosquito or Spitfires IX and XII, the latter being the premier reconnaissance craft of this theater.”<sup>34</sup>

The invasion forces in Operation TORCH were handicapped in the beginning due to a complete failure of the RAF and AAF to realize the role that photographic reconnaissance played in support of ground forces,

---

<sup>28</sup> Interview of Colonel Elliot Roosevelt, 2-11.

<sup>29</sup> Interview of Colonel Elliot Roosevelt, 11.

<sup>30</sup> Robert C. Ehrhart et al., “Building an Air Intelligence Organization”, 127; Glenn B. Infield, *Unarmed and Unafraid* (New York: The Macmillan Company, 1970), 66-67.

<sup>31</sup> Interview of Colonel Elliot Roosevelt, 5.

<sup>32</sup> Robert C. Ehrhart et al., “Building an Air Intelligence Organization”, 127.

<sup>33</sup> Interview of Colonel Elliot Roosevelt, 9.

<sup>34</sup> Alexander S. Cochran, Jr., Robert C. Ehrhart, and John F. Kreis, “The Tools of Air Intelligence: ULTRA, MAGIC, Photographic Assessment, and the Y-Service” in *Piercing the Fog: Intelligence and Army Air Forces Operations in World War II*, ed. John F. Kreis (Washington, DC: Air Force Historical Studies Office, 1996), 81.

not to mention the intricacies of carrying out an operation of the size and scope of that in North Africa.<sup>35</sup> Nonetheless, photographic intelligence “would prove essential to the planning, conduct, and evaluation of nearly all aspects of air combat operations.”<sup>36</sup> Photo reconnaissance was only one piece of the air intelligence picture. Coupled with signals intelligence, or the interception of radio and landline communication, the Allies were to develop a fuller understanding of the Axis strategic, tactical, and operational plans.

### *Signals Intelligence*

During the Second World War, signals intelligence (SIGINT) was broken into three basic categories. The first category of intelligence was “derived from the solution of low-grade codes and ciphers and from plain text”<sup>37</sup> and was classified as ‘Y’ intelligence from the British Yorker Service, which operated the signal intercept stations. ‘Y’ intelligence “consisted largely of radio messages between lower echelons of command and between ground stations and aircraft in flight.”<sup>38</sup> ‘Y’ intercepts contributed to the intelligence picture by monitoring enemy aircraft transmissions. These intercepts provided not only a real-time assessment of the flow of the air battle, but more importantly, provided insight into German aerial tactics. ‘Y’ intercepts also help identify the most likely locations of primary fighter bases and fighter control locations, the air defense organization and fighter areas of responsibilities.<sup>39</sup>

The second category, and the primary emphasis of this paper, focused on the intercept and decryption of high-grade enemy codes and ciphers as a result of the enemy’s use of the Enigma code machine—

---

<sup>35</sup> Interview of Colonel Elliot Roosevelt, 11.

<sup>36</sup> Alexander S. Cochran. Jr. et al., “The Tools of Air Intelligence”, 58.

<sup>37</sup> Diane T. Putney, ed., *ULTRA and the Army Air Forces in World War II: an Interview with Associate Justice of the U.S. Supreme Court Lewis F. Powell, Jr.* (Washington, DC: U.S. Government Printing Office, 1987), 80.

<sup>38</sup> Putney, *ULTRA and the Army Air Forces*, 80.

<sup>39</sup> Alexander S. Cochran. Jr. et al., “The Tools of Air Intelligence”, 96.



information classified as ULTRA.<sup>40</sup> During the interwar years, the intelligence organization in Britain reorganized to create a number of inter-departmental efficiencies and improve coordination, resulting in the establishment of a section of the Government Code and Cypher School at Bletchley Park. The mission of this organization was to focus solely on radio intercepts to include decryption and interpretation of Enigma-coded messages.<sup>41</sup> As Ralph Bennett noted, “It was in the Mediterranean that ULTRA won its spurs, so to speak, and demonstrated that it was capable of rendering major assistance in strategic planning”<sup>42</sup> The challenge of time and security inhibited the value of ULTRA as a tactical tool in the following ways: first, the time necessary to intercept, decrypt, translate, assess, and finally transmit to the field commands; second, once received in the field it then had to be evaluated for significance to the current tactical situations and subsequently converted into operational orders. Regardless, ULTRA proved to be the most reliable and comprehensive source of accurate intelligence on the German Air Force (GAF). The Germans, confident that the Enigma machine code could not be broken and unaware that the Allied intelligence services were eavesdropping, transmitted sensitive communications wirelessly. This information was the primary advantage of ULTRA.<sup>43</sup> With ULTRA intercepts in hand, Bletchley “could disregard less reliable, contradictory intelligence and confidently present” insights into enemy plans.<sup>44</sup> “Ultra’s success required fusing all grades of intelligence and all [SIGINT] elements—interception, traffic analysis, direction finding, and cryptoanalysis.”<sup>45</sup>

---

<sup>40</sup> Putney, *ULTRA and the Army Air Forces*, 80.

<sup>41</sup> F.H. Hinsley, *British Intelligence in the Second World War*, Abridged Version, (New York: Cambridge University Press, 1993), 3-13; Ratcliff, *Delusions of Intelligence*, 3.

<sup>42</sup> Ralph Bennett, *Ultra and Mediterranean Strategy* (New York: William Morrow & Company, Inc, 1989), 8.

<sup>43</sup> Bennett, *Ultra and Mediterranean Strategy*, 17.

<sup>44</sup> Ratcliff, *Delusions of Intelligence*, 115.

<sup>45</sup> Ratcliff, *Delusions of Intelligence*, 107.

As with any source of intelligence, ULTRA was only as good as those who used it. Possession of ULTRA material did not necessarily mean it would be properly interpreted. ULTRA intercepts were more effective and less apt to be misinterpreted if they were fused with other intelligence, such as 'Y', photo reconnaissance, or interrogation reports.<sup>46</sup> Yet, "For ULTRA to be useful operationally, commanders in the field need rapid access to the intelligence."<sup>47</sup>

### *Security and Dissemination of ULTRA*

The adage that "[i]ntelligence demands security, and security limits exploitation"<sup>48</sup> is no more evident than in the procedures implemented to protect ULTRA intelligence. ULTRA was only disseminated through a network of secure stations between Bletchley Park and the North Africa Theater. These ULTRA-indoctrinated stations were known as Special Liaison Units (SLU) and Mobile Relay Units and were vital to the timely dissemination of intelligence to the theater commanders.<sup>49</sup> ULTRA information was strictly channeled through and within the SLU network to maintain integrity and security of the system. Messages decrypted at BP were transmitted, to the large extent, over secure teleprinter lines to the SLU for personal delivery to the intended recipient. Ratcliff writes that to maintain security of ULTRA intelligence, "After the day's intelligence discussion ended, the SLU officer took back the Ultra documents. Then he burned them."<sup>50</sup> Even though ULTRA "never included tactical or strategic conclusions or recommendations", the practices of the SLU officers inhibits the ability to definitively comprehend the influence of the day-to-day decryption of Enigma traffic.

---

<sup>46</sup> Alexander S. Cochran, Jr. et al., "The Tools of Air Intelligence", 73.

<sup>47</sup> Ratcliff, *Delusions of Intelligence*, 119.

<sup>48</sup> Ralph Bennett, *Behind the Battle: Intelligence in the War with Germany, 1939-1945* (London: Pimlico, 1999), 131.

<sup>49</sup> Ratcliff, *Delusions of Intelligence*, 119.

<sup>50</sup> Ratcliff, *Delusions of Intelligence*, 120-121; See also Vincent Orange, *Coningham: A Biography of Air Marshal Sir Arthur Coningham* (Washington DC: Center for Air Force History, 1992), 93.

## Summary

The strategic value of the Mediterranean, though lost on the German high command, began to reveal itself as early as the spring of 1942. Confronting the Axis forces in North Africa began to deplete critical resources that would otherwise be employed against Britain in the west or the USSR in the East. ULTRA decrypts revealed an increasing manpower shortage in the GAF, particularly within its fighter forces, as a result of the over-extension of forces on multiple fronts. ULTRA, photo reconnaissance, and other intelligence sources exposed a decline in the number of German single-engine fighters on the western front as Berlin shifted resources to the Mediterranean and Soviet Union.<sup>51</sup> The Axis buildup in the deserts of Tunisia and the subsequent campaign for air superiority in North Africa would be the focus of Allied air forces in Operation TORCH in the fall of 1942.

---

<sup>51</sup> Hinsley, et al., *British Intelligence*, Vol. II, 238, 521.

## **Chapter 2**

### **Northwest Africa and Operation TORCH**

*For all its awesome history as a battleground between civilizations, the Middle East did not strike American strategists as an area in which the European war could be expeditiously won. On the other hand, they recognized it as an area in which the global war could be very speedily lost.*

— Wesley F. Craven and James L. Cate,  
*The Army Air Forces in World War II*

The Mediterranean theater, to include the Near and Middle East and North Africa, played an important role for the Allies in securing a foothold on the European continent and an arena for battling the Axis prior to the campaigns on the continent. However, the MTO was a crucial strategic theater in its own right. Possession of this strategic region was necessary for the control of the Mediterranean, the vital Suez Canal, and the Middle East with its oil. Germany, at a serious disadvantage due to the lack of indigenous natural oil deposits, was forced into a perpetual oil crisis by 1942. The German war machine relied on oil supplies from Ploesti, Romania to meet the increasing requirement for this precious commodity which flowed via sea-borne convoy through the Black Sea and eventually into the Mediterranean to supply Axis forces in North Africa.<sup>1</sup> Besides the all-important shipping lanes and the straits connecting the Atlantic to the Indian Ocean, the Mediterranean was the only area, other than the British Isles, from where the Western Allies could approach German-controlled territory on the continent of Europe, and in particular strategic industrial targets such as Ploesti oil production.

---

<sup>1</sup> Douglas Porch, *The Path to Victory: The Mediterranean Theater in World War II* (New York: Farrar, Straus and Giroux, 2004), 7.

## Operation TORCH: Strategic Decisions

In 1940, the policy of the American government regarding support to the Allied war effort was strictly coupled to the Lend-Lease program.<sup>2</sup> Under this program, the United States promised materiel in the form of tactical aircraft to be allocated as follows: 6,634 to Great Britain, 1,835 to the Soviet Union, 407 to China, and 109 to other nations.<sup>3</sup> The Mediterranean, from the straits of Gibraltar to the Suez Canal represented a strategic line of communication for the delivery of this materiel. Yet, the potential presence of German forces in the region “constituted a menace to the Middle East and all it stood for—rich resources, the lend-lease route to Russia, and Britain’s link with India and the Southwest Pacific.”<sup>4</sup>

The principal feature of the war in the Mediterranean during 1941 was the battle for control of the lines of communication between Europe and North Africa.<sup>5</sup> The RAF Middle East had recognized in 1940 that the basic strategy of desert warfare in the Mediterranean was to secure airfields and ports. In the words of Air Marshal Peter Drummond, Deputy AOC-in-C, RAF Middle East Air Command, “Whoever held the airfields on the shores of the Mediterranean could pass his own ships through that sea with reasonable safety and could forbid the route to the ships of the enemy.”<sup>6</sup> The Royal Navy and RAF were called upon to defend the critical ports and airfields on Greece and Crete in the latter months of 1940. In the first test of Allied air power against the *Luftwaffe* in the Mediterranean, an inadequately armed RAF was ultimately unable to fend off the Axis advance, and the RAF was forced to evacuate these

---

<sup>2</sup> Wesley Frank Craven and James Cate, eds., *The Army Air Forces in World War II. Vol. I, Plans and Early Operations*. (New York: University of Chicago Press, 1950), 103.

<sup>3</sup> Craven and Cate, *Plans and Early Operations*, 134.

<sup>4</sup> Craven and Cate, *Plans and Early Operations*, 570.

<sup>5</sup> George F. Howe, *Northwest Africa: Seizing the Initiative in the West* (Washington, DC: Center Of Military History, 1993), 7.

<sup>6</sup> Air Marshal Sir Peter Drummond, “The Air Campaign in Libya and Tripolitania,” *RUSI Journal* 88 (1934): 257 quoted in Vincent Orange et al., *Airpower and Ground Armies: Essays on the Evolution of Anglo-American Air Doctrine 1940-1943* (New York: Air University Press, 2003), 8.

critical airfields in May 1941. Sir Arthur Tedder writes in his memoirs that Crete had proved the central fact of war—"Air superiority was the pre-requisite to all winning operations, whether at sea, on land or in the air."<sup>7</sup>

The occupation of Crete by the *Luftwaffe* improved the Axis position in the violent struggle to fracture the British connection between Malta and the eastern Mediterranean.<sup>8</sup> The island of Malta was of strategic importance to the British, a fact not lost on the German high command. Howe writes, "The British island of Malta, between the Sicilian straits and Crete, was a base for aircraft, destroyers, and submarines which severely curtailed the flow of supplies and reinforcements from Italy to Tripoli. The fortunes of Rommel's command seemed almost directly proportional to Axis success in neutralizing Malta."<sup>9</sup>

Frustrated by the failures of the Royal Navy to defend Crete, Tedder complained that without air superiority, the ability to protect and control the lines of communication and the British position in Egypt, on which the capacity to wage war in the theater depended, "had now to be exercised by air, or not at all."<sup>10</sup> As a result, "the larger role now assumed by air power had swelled by so much the demand for American aircraft."<sup>11</sup> It was now obvious in light of these recent Axis successes that the "flow of American personnel and supplies to the Middle East would continue to grow."<sup>12</sup>

The American and British Conversations (ABC-1), held in Washington (22 December 1941 - 14 January 1942) between the United States and a British delegation of chiefs of staff, resulted in the "first

---

<sup>7</sup> Arthur Tedder, *With Prejudice: The War Memoirs of Marshal of the Royal Air Force, Lord Tedder* (London: Cassell & Company Ltd, 1966), 105.

<sup>8</sup> Howe, *Northwest Africa*, 8.

<sup>9</sup> Howe, *Northwest Africa*, 8.

<sup>10</sup> Arthur Tedder, *War Memoirs*, 112-115.

<sup>11</sup> Wesley Frank Craven and James Cate, eds., *The Army Air Forces in World War II. Vol. II, Europe: TORCH to POINTBLANK*, (New York: University of Chicago Press, 1950), 4.

<sup>12</sup> Craven and Cate, *TORCH to POINTBLANK*, 4.

systematic statement of common strategic principles” on the Allied war effort.<sup>13</sup> These talks outlined the grand strategy for the defeat of the Axis, to include the employment of forces, areas of responsibility, and, most importantly to Britain, an agreement that the United States would continue to aid the Allies in the resistance of the Axis forces.<sup>14</sup> In July 1942 a formal agreement was finalized, dubbed the Arnold-Portal-Towers agreement, authorizing the build-up of nine groups of American aircraft and personnel for service in the Mediterranean theater.<sup>15</sup> United States strategic planners initially disagreed with the need for opening a Mediterranean front, primarily because it meant siphoning away precious resources for a highly desired assault on the continent of Europe. However, based on political rather than military concerns, President Roosevelt and Prime Minister Churchill overruled their military advisors and ordered an amphibious assault into North Africa in the fall of 1942.<sup>16</sup>

### **The Air Plan**

Air War Plans Division-42 (AWPD-42), which outlined the primary objectives for the strategic plan in the Mediterranean and the Middle Eastern theaters, was completed in October 1942. AWPD-42 asserted that the primary requirement for the air force in North Africa and the Middle East was to provide air support for a land offensive.<sup>17</sup> Air operations in North Africa were focused on air support for “opening of the Mediterranean and a base for operations against Italy” while air operations in the Middle East were to “hold the Middle East and drive the

---

<sup>13</sup> Craven and Cate, *Plans and Early Operations*, 136.

<sup>14</sup> Craven and Cate, *Plans and Early Operations*, 130.

<sup>15</sup> Craven and Cate, *TORCH to POINTBLANK*, 8.

<sup>16</sup> Robert C. Ehrhart, Thomas A. Fabyanic, and Robert F. Futrell, “Building an Air Intelligence Organization and the European Theater”, in *Piercing the Fog: Intelligence and Army Air Forces Operations in World War II*, ed. John F. Kreis (Washington, DC: Air Force Historical Studies Office, 1996), 157.

<sup>17</sup> Air War Plans Division-42 (AWPD-42), Requirements for Air Ascendancy, October 17, 1942. HRA Call no. 145.82-42, IRIS no. 118168, in USAF Collection, AFHRA Part II, para. 2b-2c.



Axis forces out of Africa.”<sup>18</sup> Airpower in the Mediterranean had four primary tasks: 1) destroy the enemy’s weapons and air forces before they could be used against allied forces; 2) provide tactical assistance to ground forces in battle; 3) keep sea lanes open, and to protect shipping and harbors; and 4) support partisan efforts in the Balkans and Northern Italy.<sup>19</sup>

Operation TORCH was the first major attempt by the Americans and British at conducting joint and combined operations. The immediate threat was not the GAF, but the Vichy French forces that still controlled French North Africa. Despite several sensitive and tenuous meetings with French leaders in Africa to convince them to permit the landings unopposed, Allied commanders had to assume military opposition.<sup>20</sup>

General Eisenhower, as the Commander-in-Chief, exercised direct command over the commanding generals of the three task forces assigned to capture the vital port cities of Casablanca (Western), Oran (Center), and Algiers (Eastern). Operation TORCH called for simultaneous amphibious landings on the North African beaches, as well as airborne drops to seize airfields from which to gain air superiority.<sup>21</sup> The Western Task Force's mission was to secure the port at Casablanca and adjacent airfields and, in conjunction with the Center Task Force at Oran, to establish and maintain communications between Casablanca and Oran (Figure 2).<sup>22</sup>

---

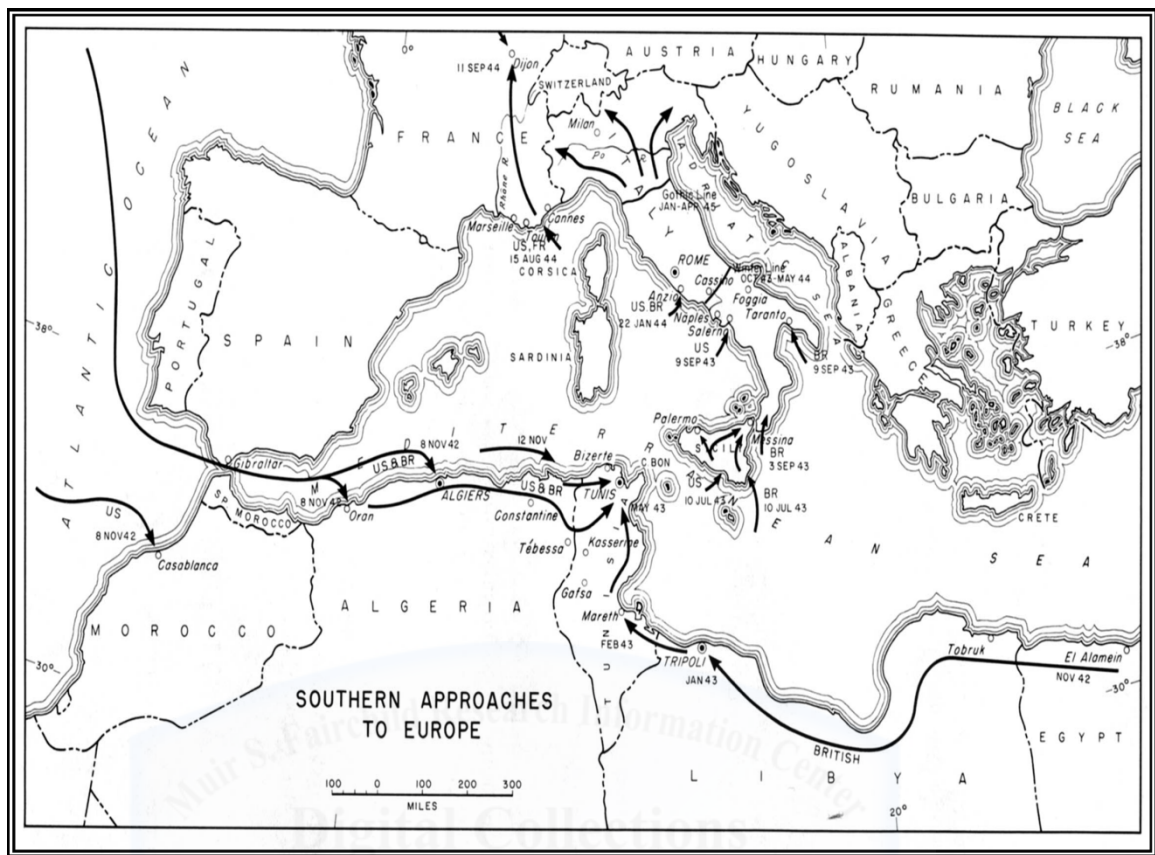
<sup>18</sup> AWPD-42, Part IV, 4.

<sup>19</sup> Headquarters Twelfth Air Force, Field Order 1, Oct 15, 1942, HRA Call no. 520.2132, IRIS no. 219497, in USAF Collection, AFHRA.

<sup>20</sup> Headquarters Twelfth Air Force, Field Order 1, Oct 15, 1942, Annex 2, HRA Call no. 520.2132, IRIS no. 219497, in USAF Collection, AFHRA; Dwight D. Eisenhower, *Crusade in Europe* (Garden City, NY: Doubleday & Company, 1948), 86-87.

<sup>21</sup> Howe, *Northwest Africa*, 46.

<sup>22</sup> Howe, *Northwest Africa*, 46; Craven and Cate, *TORCH to POINTBLANK*, 53-55.



**Figure 2. Map of Mediterranean Theater of Operations, 1942-1945**

Source: Perry-Castañeda Library Map Collection, University of Texas at Austin

With operations conducted in support of the Central and Western Task forces, Twelfth Air Force aircraft outnumbered those in Eastern Air Command by a ratio of more than 2 to 1. The air plan called for the Twelfth Air Force to initially commit 1,094 aircraft to Operation TORCH, while the combat-experienced RAF supplied the Eastern Air Command (EAC) with 454 planes of all types—234 of which were the short-ranged Hurricane and Spitfire fighters.<sup>23</sup>

The air requirements for the Western Air Command were calculated at 160 short-range fighters, 13 fighter-observation aircraft, and 15 light bombers. Aircraft were to begin arriving on D+2 and would

<sup>23</sup> History of the Twelfth Air Force, Vol. I (Draft), HRA no. 650.057-3, IRIS no. 245172, in USAF Collection, AFHRA, 19; Craven and Cate, *Vol. II, TORCH to POINTBLANK*, 54.

incrementally increase with daily flights from Gibraltar.<sup>24</sup> Within six days of the initial assault, the assigned aircraft were to be fully operational supporting the Western Task Force in the Casablanca area.<sup>25</sup> Final end strength would consist of 400 short-range fighters, 240 long-range fighters, 70 heavy bombers, 228 light bombers, and 156 transports.<sup>26</sup> By 12 December 1942, the Axis air forces possessed just 1,220 aircraft in the entire Mediterranean Theater. A majority of these aircraft—298 German and 574 Italian—were based in Sicily and Sardinia; less than 200 miles from Tunisia and Bizerte.<sup>27</sup>

At the onset of Operation TORCH, the *Luftwaffe* employed a force of 190 aircraft—which included 70 dive bombers, 50 single-engine fighters.<sup>28</sup> On 10 November, Hitler announced that a “bridgehead was to be gained and held in Tunisia in a race with the Allied forces; [Field Marshal Albert] Kesselring was to subordinate all other activities in the Mediterranean to this task.”<sup>29</sup> The air support for this mission was to be the responsibility of *Fliegerkorps II* and “the primary aim of the *Luftwaffe* was to slow down the Allied advance and so enable the Axis land forces to be built up in preparation for an offensive. After the safeguarding of Axis supplies, a vigorous offensive would be adopted so as to gain the necessary local air superiority.”<sup>30</sup> Based on this objective, “the operational strength of *Fliegerkorps II* had risen to 445 aircraft from the 283 of a month earlier.”<sup>31</sup> Approximately 915 Axis aircraft were available in Sicily and Sardinia for operations against TORCH forces on 8

---

<sup>24</sup> Gibraltar was of significant strategic importance to Operation TORCH. In November 1942 the Allied forces did not possess a single land base west of Malta in the Mediterranean that could support air operations for the amphibious assaults. Gibraltar would serve as both an operational base and a staging point prior to the assault on North Africa. Eisenhower, *Crusade in Europe*, 95.

<sup>25</sup> Howe, *Northwest Africa*, 46.

<sup>26</sup> History of the Twelfth Air Force Vol. I (Draft), 19

<sup>27</sup> I.S.O. Playfair, et al., *The Mediterranean and the Middle East, Vol. IV: The Destruction of the Axis Forces in Africa* (London: HMSO, 1966), 116.

<sup>28</sup> H.A. Probert, *The Rise and Fall of the German Air Force, 1933-1945* (London: Arms & Armour, 1987), 138.

<sup>29</sup> Playfair, et al., *Mediterranean and the Middle East*, 171.

<sup>30</sup> Playfair, et al., *Mediterranean and the Middle East*, 171.

<sup>31</sup> Playfair, et al., *Mediterranean and the Middle East*, 171.

November. By 15 November *Fliegerfuehrer Tunisia* was installed as a new command to support the German ground troops in their efforts against the Allied advance to Tunisia from the west. In the subsequent weeks *Luftwaffe* reinforcement flowed into the Mediterranean theater increasing numbers to a peak of 1,220 aircraft.<sup>32</sup>

Until a number airfields were captured along the North African port cities, the entire burden of air cover and air support would fall on the few carrier-borne aircraft accompanying the Allied task forces.<sup>33</sup> Air operations in the Casablanca assault were largely dependent on the capture of the Port Lyautey airfield—the most valuable airfield in the area due to its hard-surfaced runways. The 33rd Pursuit Group catapulted 77 P-40s from the auxiliary aircraft carrier *Chenango*, and was the first unit to land aircraft at this airfield.<sup>34</sup> The lack of improved airfields would be the Achilles heel of the Allied air forces as they struggled for Tunisia in the winter of 1942 and early 1943.

To gain and hold air superiority, the Center Task Force at Oran planned to use four elements: (1) an airborne drop south of Oran, near La Senia and Tafaraoui, to seize the airfields; (2) armored columns would support the paratroopers in holding these airfields as well as a subsidiary airstrip at Lourmel, southwest of Oran; (3) dive bombers and fighters from three aircraft carriers would neutralize the French airfields and clear the air of hostile aircraft; (4) as soon as an airfield had been secured, land-based planes of the Twelfth Air Force were to be flown in from Gibraltar.<sup>35</sup>

The Eastern Task Force--comprised largely of British forces—once safely ashore and in control of Algiers and its airfield at Maison Blanche, was tasked with surging forward to gain control of Tunis before Field

---

<sup>32</sup> Probert, *Rise and Fall of the German Air Force*, 145-148.

<sup>33</sup> Playfair, et al., *Mediterranean and the Middle East*, 141.

<sup>34</sup> Craven and Cate, *TORCH to POINTBLANK*, 56; History of Twelfth Air Force, HRA Call no. K650.01-18A, IRIS no. 511171, in USAF Collection, AFHRA, 3.

<sup>35</sup> Howe, *Northwest Africa*, 48; Craven and Cate, *Vol. II, TORCH to POINTBLANK*, 56; History of the Twelfth Air Force, Vol. I (Draft), 20.

Marshal Rommel and Colonel-General Jürgen von Arnim could seize this vital port. Eastern Air Command, in addition to supporting the Eastern Task Force, was charged with the protection of ports and convoy routes along the Mediterranean coast.<sup>36</sup>

In the early weeks of TORCH, the primary contribution of the Allied air forces was close air support for advancing ground forces and airfield attacks to reduce the enemy's buildup. Although the Allies expected heavy resistance initially against an estimated force of 1,347 Axis fighters and bombers,<sup>37</sup> land-based Allied air forces from the Twelfth Air Force and the Eastern Air Command had a limited role in the TORCH invasion. During the initial amphibious assault, ground and naval forces received air support from an allotment of carrier-based naval air consisting of 108 F4F fighters, 38 SBD-3 dive bombers, and 27 TBF torpedo bombers.<sup>38</sup> After the airfields in Casablanca were secured, land-based assets from XII Air Support Command were primarily occupied in supporting the ground forces of the Western Task Force—having engaged in no air combat.<sup>39</sup> Within days of the initial amphibious assaults, the port cities of Casablanca, Oran, and Algiers were seized and, after minimal resistance, the Vichy French forces signed the Armistice in Morocco on 11 November.<sup>40</sup>

The next objective—preventing the establishment of a bridgehead for the insertion of Axis units and supplies into Tunisia—was initiated with an order to capture two forward airfields to extend air support for British and American ground units moving eastward into Tunisia. With the

---

<sup>36</sup> History of the Twelfth Air Force, Vol. I (Draft), 16. Playfair, et al., *Mediterranean and the Middle East*, 184.

<sup>37</sup> Headquarters Twelfth Air Force, Field Order 1, Oct 15, 1942, annex 2.

<sup>38</sup> Memorandum, Chief of Naval Operations to Commander in Chief, US Atlantic Fleet, dated 16 September, 1942, HRA Call no. 650.430-1, IRIS no. 246271, in USAF Collection, AFHRA; Eisenhower, *Crusade in Europe*, 91.

<sup>39</sup> History of Twelfth Air Force, IRIS no. 511171, 3; Alfred F. Simpson, Lecture, 12 February 1952, "Development of Tactical Air Doctrine in the Mediterranean Theater, HRA Call no. K239.7165252-103, IRIS no. 918293, in USAF Collection, AFHRA.

<sup>40</sup> Howe, *Northwest Africa*, 171, 252.



Eastern Task Force beginning to develop a front on the ground in Tunisia, “calls for air support were increasing and in the [late weeks of November] the fighters [from the Eastern Air Command] flew nearly 1,500 sorties mainly on reconnaissance and protective tasks.”<sup>41</sup> The GAF, operating out of the airfields at Tunis and Bizerte, had a decided advantage over the RAF. With 150 fighters and dive bombers supported by long-range bombers from Sicily and Sardinia, the GAF was well equipped to confront nearly any Allied air offensive.<sup>42</sup> Even still, on November 12, British parachutists carried by the AAF's 64th Troop Carrier Group overran the airfield at Bône, Algeria. Three days later, the 60th Troop Carrier Group dropped American paratroops at Youks-les-Bains airfield near the Tunisian border.<sup>43</sup>

Despite the initial forward progress, the Allies were halted by the German war machine 17 days later—just 16 miles to the west of Tunis.<sup>44</sup> Winter rains further complicated air operations—quickly turning the unpaved airfields into islands of mud and anchoring Allied aircraft to the ground. The Germans, however, with modern airfields in Sicily, Sardinia, and Tunisia, flew bombers and their new fighter—the fast, well-armed Focke-Wulf (Fw) 190—from all-weather, paved runways.<sup>45</sup> As the winter weather worsened late in December, the ground forces went on the defensive.<sup>46</sup> The lull in ground operations allowed the Allied air forces to transition to full-time interdiction missions against Axis ports, shipping, and airfields; a mission better suited to demonstrate the

---

<sup>41</sup> Playfair, et al., *Mediterranean and the Middle East*, 174.

<sup>42</sup> Craven and Cate, *TORCH to POINTBLANK*, 81.

<sup>43</sup> Craven and Cate, *TORCH to POINTBLANK*, 79-81.

<sup>44</sup> Craven and Cate, *TORCH to POINTBLANK*, 87; Eisenhower, *Crusade in Europe*, 124.

<sup>45</sup> F.H. Hinsley, et al., *British Intelligence in the Second World War: Its Influence on Strategy and Operations*, Vol. II, (New York: Cambridge University Press, 1981), 487-491; Playfair, et al., *Mediterranean and the Middle East*, 171. The arrival of the FW 190 with its heavier armament and armor made it difficult for an attacking fighter to get at the pilot. Together with its compactness, and high maneuverability contributed to a formidable aircraft; superior generally to any aircraft that the Allies fielded in North Africa at that time.

<sup>46</sup> Craven and Cate, *TORCH to POINTBLANK*, 91.

flexibility of air power; as opposed to “air umbrella” coverage of ground forces.<sup>47</sup>

### **The Role of Intelligence**

Attainment and retention of air superiority over the battlefield was an essential prerequisite for the effective contribution by air forces in supporting land operations. All other tasks, interdiction of enemy reinforcement and supply, reconnaissance, and attacking targets in forward areas, were secondary until a favorable air situation was established. Air intelligence, although in its infancy, would play a central role in gaining air superiority. Even still, the value of intelligence in the early phases of TORCH was mixed.<sup>48</sup>

In the weeks before the invasion, intercepts from both ULTRA and ‘Y’ signals provided Allied intelligence with information to track the shift of short-range fighters and anti-shipping air units from the eastern Mediterranean, Germany, and Norway into Sicily and Sardinia. These movements reinforced the confidence of Allied planners that Berlin, although aware of the Allied convoys, assumed they were headed farther east to Malta, Sicily or Tripolitania.<sup>49</sup>

Within days of the North Africa invasion, ULTRA intercepts from the German Air Force Enigma revealed the German decision to move ground troops, close air support, and fighter units into North Africa. By the middle of the month, the Allies knew the Germans were moving the technologically superior Fw 190 into Bizerte, and by mid-December at least 850 German aircraft were operating out of the all-weather airfields in Tunisia. The Axis air forces, although nearly equal in size, would secure air superiority over the TORCH air forces in North Africa.<sup>50</sup>

---

<sup>47</sup> Craven and Cate, *TORCH to POINTBLANK*, 123.

<sup>48</sup> Robert C. Ehrhart et al., “Building an Air Intelligence Organization”, 157.

<sup>49</sup> Hinsley, et al., *British Intelligence*, Vol. II, 480-481; Diane T. Putney, ed., *ULTRA and the Army Air Forces in World War II: an Interview with Associate Justice of the U.S. Supreme Court Lewis F. Powell, Jr.* (Washington, DC: U.S. Government Printing Office, 1987), 3.

<sup>50</sup> Hinsley, et al., *British Intelligence*, Vol. II, 487-491.



Initial intelligence operations suffered from the growing pains of a hastily developed outfit with inexperienced operators, inadequate equipment, and a flawed organization. With time, however, the intelligence output improved with the integration of British staff. The information gathered from intercepted GAF radio transmissions sent in the clear (i.e., unencrypted) or via low-grade encrypted messages was often of limited operational value, yet because the Allies had not properly planned a defensive radar-warning net in North Africa, these interceptions provided the only tactical warning of incoming *Luftwaffe* raids for some time.<sup>51</sup>

The lack of Allied progress from November through February demonstrated that even the best intelligence could not replace inadequate planning and force employment. The need to protect the source of ULTRA intelligence limited the immediate tactical value of the information. To prevent the enemy from realizing that his high-level messages were being read, commanders approved no mission unless it could be explained by a solidly plausible second source, known to the enemy. This stipulation hampered the anti-shipping campaign as no ship could be attacked unless the enemy would be able to interpret the attack on the basis of some other possible compromise of encrypted messages. To meet this dilemma, "Allied air forces provided camouflage through increasing reconnaissance flights and photo reconnaissance" to provide a second alternative source. These flights had to appear repetitive and routine so as not to draw awareness to any specific intelligence.<sup>52</sup> Most ULTRA targets were covered by general air missions,

---

<sup>51</sup> Hinsley, et al., *British Intelligence*, Vol. II, 742-743; Group Captain R. H. Humphreys, "The Use of 'U' in the Mediterranean and Northwest African Theatres of War, October 1945," in *Reports Received by U.S. War Department on the Use of ULTRA in the European Theater in World War II*, Special Research History (SRH)-037, HRA Call no. 160.032-27, IRIS no. 1032654, in USAF Collection, AFHRA, 25; Louis Brown, *A Radar History of World War II: Technical and Military Imperatives* (Bristol, UK: Institute of Physics Publishing Ltd., 1999), 353.

<sup>52</sup> R.A. Ratcliff, *Delusions of Intelligence: Enigma, Ultra, and the End of Secure Ciphers* (New York: Cambridge University Press, 2006), 125.

not limited to specific locations. This eventually led the Germans to believe that it was almost impossible to hide anything from Allied air oversight, as well as reinforced “German assumptions of Allied superiority in reconnaissance, radar, and [directional finding].”<sup>53</sup>

The interdiction mission to halt the movement of supplies to the German front lines continued against enemy shipping, while Allied air forces also executed crippling attacks on an already diminishing enemy air capability. Urged on by his air commanders, General Spaatz and Air Marshal Coningham, General Eisenhower pleaded with the Combined Chiefs of Staff for additional photographic reconnaissance capability; asserting that it was “absolutely essential” in the effort to reduce enemy lines of communication into Tunisia.<sup>54</sup> The NAAF commander stressed at an air commanders’ conference two months later that regular reconnaissance over the Sicilian straits and the Tyrrhenian Sea was fundamental to an effective anti-shipping campaign to deny supplies and reinforcements to Axis forces in North Africa.<sup>55</sup> Together ULTRA and photo reconnaissance provided the intelligence necessary for Allied pilots and submarines to locate and attack Axis ships at sea. Nearly a quarter of the Axis supplies shipped from Italy failed to arrive in North Africa during the opening months of 1943.<sup>56</sup>

ULTRA’s insights matched to ‘Y’ intercepts provided Allied commanders with the material for an accurate analysis of damage reports from enemy airfields. This information led to a full understanding of the effectiveness of Allied attacks, as well as to suggestions of when and where to repeat them.<sup>57</sup> “Using ULTRA, as well as visual means and photoreconnaissance, the Allies concentrated on

---

<sup>53</sup> Ratcliff, *Delusions of Intelligence*, 125.

<sup>54</sup> Message, to CoSs, Jan 6, 1943, Spaatz Papers, box 10, cited in Robert C. Ehrhart et al., “Building an Air Intelligence Organization”, 163.

<sup>55</sup> Minutes, Air Commanders Conference March 17, 1943, LC, Spaatz Papers, box 10, cited in Robert C. Ehrhart et al., “Building an Air Intelligence Organization”, 163.

<sup>56</sup> Porch, *The Path to Victory*, 399.

<sup>57</sup> Humphreys, “Use of ‘U,’” SRH-037, 25.

offensive strikes against Axis airfields as the most effective means to achieve air supremacy.”<sup>58</sup> On 18 January 1943, acting on British intelligence that indicated that the *Luftwaffe* was concentrating aircraft at an airfield at Castel Benito (Tripoli, Libya), the XII Bomber Command struck with 13 B-17s escorted by 33 P-38s; claiming 14 enemy aircraft destroyed, three probably destroyed, and one damaged. Four days later, in three separate attacks, El Aouina was besieged by Allied forces resulting in 12 aircraft destroyed, 19 damaged, and a direct hit on an ammunition dump.<sup>59</sup>

The use of air intelligence was not limited to attacks against enemy airfields. So effective was the intelligence network developed in 1943, that it was able to provide actionable intelligence by fusing photo reconnaissance with signals intelligence, thereby providing Allied leaders and their staffs with virtually complete records of the shipping between Tunis, Bizerte, Italy, and Sicily—often down to the cargo loads of individual vessels.<sup>60</sup>

### **The Role of Radar**

In contrast to the RAF, which arrived in the Mediterranean proficient and organized to begin radar operations, most AAF commanders had little to no understanding of the capabilities or operation of radar. The arrival of radar for the AAF began with an inauspicious start. Signal Corps units were unable to obtain their equipment, as it was inaccessible in the bottom of the holds of transports or, in some cases, had been sunk off the coast of Casablanca. As a result, it was not until eight days after the first landing that they were able to set up an SCR-602, the new lightweight intermediate radar air-

---

<sup>58</sup> Robert C. Ehrhart et al., “Building an Air Intelligence Organization”, 167-168.

<sup>59</sup> NAAF, *Air Intelligence Report*, No. 70, MICFILM Call no. 25220, IRIS no. 2007240, 19 January 1943; No. 74, 23 January 1943.

<sup>60</sup> Hinsley, et al., *British Intelligence*, Vol. II, 575-576; Humphreys, “Use of ‘U,’” SRH-037, 26-27.

warning set.<sup>61</sup> To add insult to injury, “The 560th and 561st Signal Corps Air Warning Battalions [of the XII Air Support Command (ASC)] encountered officers who had no conception of how these units were to protect air bases.”<sup>62</sup>

The first microwave radars to receive ground use in the Mediterranean were the SCR-582. During the preparations for Operation TORCH, five of these radar sets were ordered, yet due to the shortened timeline for preparations they did not arrive until late in January 1943.<sup>63</sup> One of the five sets was moved to Casablanca to track all sea-borne vessels within its range. The second SCR-582 served to overlook the harbor of Oran. The remaining three sets, after being mounted in trucks, were dispatched eastward toward Tunis to watch for enemy aircraft and track sea-borne vessels. Although the primary mission of the -582 was defense against mining by ships or enemy aircraft, they also served a secondary mission to provide navigational aid for convoys moving in and out of the channels. Further exemplifying the versatility of the SCR-582, it was also used to direct fighters to provide air support to Allied convoy under attack. With microwave (10cm) radar, the SCR-582 was not as susceptible to background clutter from either the ground or the sea, which had rendered all previous ground radars blind and helpless against low-flying aircraft. The SCR-582 could detect airplanes attempting to skirt beneath radar coverage, “something which no long-wave American or British search radar could ever do well, if at all. American microwave radar at last was stripping the enemy's aircraft of their last concealment, the dodge of flying under the radar beams.”<sup>64</sup>

During this time, the *Luftwaffe* carried out numerous attacks, mainly on troops and transports moving on the roads, railways, and

---

<sup>61</sup> George Raynor Thompson, et al., *The Signal Corps: The Test* (Washington, DC: U.S. Government Printing Office, 1978), 375.

<sup>62</sup> Brown, *Radar History of World War II*, 353.

<sup>63</sup> Henry E. Guerlac, *RADAR in World War II*, Vol. 8, (Los Angeles: Tomash Publishers, 1987), 705.

<sup>64</sup> Thompson, et al., *Signal Corps*, 378-379.

harbors in Bône. Algiers suffered a crippling attack on the Allied airfields at Maison Blanche between 20 - 22 November, in which 14 aircraft were destroyed and several others damaged on the ground, to include an entire RAF photographic reconnaissance unit. Lacking aerial interception equipment and ground control intercept radar, Allied fighters were unable to intercept and prevent the *Luftwaffe* attack. As a result of this attack, for both safety and security reasons, all B-17s were directed to fall back to Tafaraoui, Oran, forcing them to fly 1,200 miles round trip to conduct attacks in Tunis—a distance which was close to the B-17's maximum tactical radius.<sup>65</sup> The attacks on airfields in Algiers continued unopposed until 27 November, after which a flight of RAF Beaufighters, equipped with aerial interception radar, dispatched three enemy bombers. From this date on enemy losses steady increased.<sup>66</sup>

After a few fits and starts, the “Allies at once set about employing radar on a huge scale, commensurate with the long lines they had to defend extending from Casablanca to Tunisia. They concentrated their sets in the eastern area toward Tunis, and the enemy's airfields there. American radars alone soon numbered in the hundreds.”<sup>67</sup> Radar, especially in Tunisia, would help defend against night bombers and the infamous Stuka dive bomber.<sup>68</sup>

To attest to the influence of radar capabilities and its effect on the balance of air superiority, a British ground control intercept (GCI) station, working in coordination with a radar-equipped Beaufighter air interceptor (AI) at Morris, east of Bône, “claimed twenty-three enemy aircraft shot down positively and one probably during the first two weeks of December 1942. The Germans quickly learned to avoid this and any

---

<sup>65</sup> Playfair, et al., *The Mediterranean and the Middle East*, 174-75; Craven and Cate, *TORCH to POINTBLANK*, 85-86. Three Beaufighters, two P-38s, two B-17s, four Spitfire fighters, and three Photographic Reconnaissance Unit (PRU) Spitfires and associated ground equipment were destroyed. Nine Beaufighters were damaged in the attack.

<sup>66</sup> Playfair, et al., *Mediterranean and the Middle East*, 179.

<sup>67</sup> Thompson, et al., *Signal Corps*, 375.

<sup>68</sup> Thompson, et al., *Signal Corps*, 375.

other area which enjoyed the protection afforded by the GCI-AI radar combination.”<sup>69</sup>

Although radar was a still a relatively new weapon, it did prove effective in the anti-shipping and submarine hunt. In 1942, the U-boats were credited with sinking more tons of Allied shipping than the total built during that same year. With the invasion and subsequent build up of forces in of North Africa after the 8 November landings, the U-boat fleet arrived in force in the Mediterranean. On November 11, a U-boat pack quickly dispatched four merchant ships and a destroyer off the coast of Casablanca. The capture by the Western Task Force of port cities Port Lyautey and Casablanca permitted Navy PBY Catalinas to begin anti-submarine operations on 18 November. Equipped with long and medium-range radar, the PBY patrols were able to clear a fleet of 16 U-boats from within 400 miles of these ports by the end of December. Any further losses of merchant vessels after December 1942 occurred 600 miles beyond the nearest airfield.<sup>70</sup> This speaks volumes to the overwhelming success of radar in locating and eliminating the German submarine fleet; thereby gaining control of the critical shipping lanes and access to the vital ports between the straits of North Africa and Sicily.

### **Reorganization of the Allied Air Forces**

The original plan for Operation TORCH called for the assignment of an overall air commander, but Eisenhower decided against the use of a unified air force. Consequently, throughout November and December, American and British airmen fought separate wars, mainly in support of their respective army ground corps. The insistence by senior army officers to subordinate airmen under their control to provide local protection and handle local problems resulted in the ineffective and inefficient use of air power. In December 1942, frustrated over the

---

<sup>69</sup> Thompson, et al., *Signal Corps*, 376.

<sup>70</sup> Guerlac, *RADAR in World War II*, 718.



problems of coordinating the air efforts of the Twelfth Air Force and the British Eastern Air Command, General Eisenhower was convinced that it was now necessary to assign a single commander to the Allied Air Organization in the Mediterranean. "With temporary suspension of land offensives, the time has come to straighten out this matter without delay."<sup>71</sup> He informed Gen George C. Marshall, chief of staff, US Army, that in order to better coordinate his air assets, a single air commander was required, and he recommended Lt Gen Carl A. Spaatz to fill the position.<sup>72</sup> The British, concerned with Spaatz's inexperience in commanding a mixed air force of this magnitude, insisted that his chief of staff come from the RAF.<sup>73</sup> On 5 January 1943, General Spaatz was appointed the Commander, Allied Air Forces, with responsibility for the Twelfth Air Force, Eastern Air Command, as well as various French air units.<sup>74</sup> This re-organization was the first of several organizational changes that led to the emergence of a unified air effort for the final months in North Africa.

Under General Spaatz's command, immediate actions were taken to synchronize TORCH air assets. The Twelfth was consolidated and assigned responsibility for providing air support to American ground forces in North Africa, while the Eastern Air Command provided support to the British First Army. An Allied Air Support Command, commanded by Brigadier General Laurence Kuter, was organized to provide coordination between the air and ground commanders within the Allied Forces in North Africa.<sup>75</sup> These steps to improve unity of command and provide increased flexibility had some near-term effect; however, the air

---

<sup>71</sup> Message No. 3650 – NAF 72, Eisenhower to Combined CoSs, 31 December 1942, HRA Call no. 612.1622, IRIS no. 242258, in USAF Collection, AFHRA.

<sup>72</sup> Message No. 3650, Eisenhower to Combined CoSs.

<sup>73</sup> Arthur Tedder, *With Prejudice: The War Memoirs of Marshal of the Royal Air Force, Lord Tedder* (London: Cassell & Company Ltd, 1966), 385.

<sup>74</sup> Allied Force Headquarters, General Order No. 3, 5 January 1943, cited in History of the Twelfth Air Force, Vol. I (Draft), HRA Call no. 650.057-3, IRIS no. 245172, in USAF Collection, AFHRA, Ch. 9, 1.

<sup>75</sup> Allied Air Forces, General Order No. 1, 22 January 1943, cited in History of the Twelfth Air Force, Vol. I (Draft), Ch. 9, 1.



effort had still not achieved the operational advantages of a single combined air headquarters. Duplication and overlap between the air forces located in the east and those in the Western Desert, commanded by Air Vice-Marshall Coningham, necessitated a reorganization of all air assets in the Mediterranean theater to designate one Allied airman as the overall air commander.<sup>76</sup>



---

<sup>76</sup> History of the Twelfth Air Force, Vol. I (Draft), Ch. 9, 2.

### *Mediterranean Air Command*

In the final weeks of January, President Franklin D. Roosevelt and Prime Minister Winston Churchill met at Casablanca, Morocco to discuss Allied strategy and objectives for 1943. It was at this conference that an all-important strategic decision was made to exploit the Allied foothold in North Africa and continue the Allied effort in the Mediterranean following the completion of the Tunisian campaign. More importantly for improved coordination between Allied air forces, Roosevelt and Churchill agreed that a reorganization of forces was in order. The first step towards obtaining unity of command in the theater was to appoint General Eisenhower as the Commander-in-Chief of the Mediterranean Theater of Operations. Second, the Combined Chiefs of Staff agreed to adopt the organizational command structure used by the British Desert Air Force and the Eighth Army in the Western Desert. Finally, to optimize the coordination between the Eastern Air Command and the Twelfth Air Force, the Allied leaders agreed on establishing one Air Force for the Mediterranean Theater. A planning committee was appointed by order of General Spaatz on 3 February 1943 to make recommendations on the composition required for a single air force.<sup>77</sup> Two weeks later the resulting organization consisted of a senior air headquarters in the Mediterranean under Air Marshal Arthur Tedder as Commander, Mediterranean Air Command. The appointment of Tedder “facilitated the co-ordination of Allied efforts, and in particular the concentration of all available air resources when required at any vital point.”<sup>78</sup> Tedder’s command included the Northwest African Air Force (NAAF), under General Spaatz; Middle East Air Command, under Air Chief Marshal

---

<sup>77</sup> History of the Twelfth Air Force, Vol. I (Draft), Ch. 9, 2.

<sup>78</sup> First Viscount Montgomery of Alamein Bernard Law Montgomery, *El Alamein to the River Sangro* (New York: E.P. Dutton & Company, Inc., 1949), 69.

Sholto Douglas; and RAF Malta Command, under Air Vice Marshal Keith Park.<sup>79</sup>

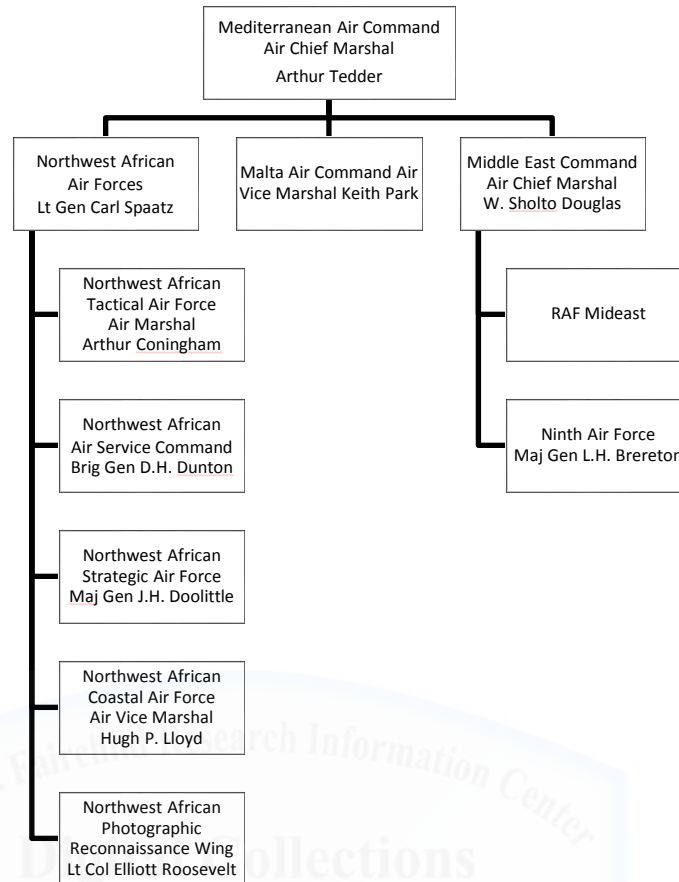
Under General Spaatz, the NAAF was organized functionally into the following six subordinate units: Northwest African Strategic Air Force, commanded by General James H. Doolittle; Northwest African Tactical Air Force, commanded by Air Marshal Arthur Coningham; Northwest African Air Service Command, commanded by Brigadier General Delmar H. Dunton; Northwest African Coastal Air Force, commanded by Air Vice Marshal Hugh P. Lloyd; Northwest African Training Command, commanded by Brigadier General John K. Cannon; and Northwest African Photographic Reconnaissance Wing, commanded by Lieutenant Colonel Elliot Roosevelt (Figure 3).<sup>80</sup> The units and personnel assigned to the Twelfth Air Force were subsequently re-assigned to one of the subordinate commands of the NAAF. The XII Air Service Command (not to be confused with the Air Support Command assigned to Coningham) was the only Twelfth Air Force unit to maintain its original identity when it was assigned to NAAF. Except for administrative purposes, the Twelfth as it was known at the opening of TORCH, ceased to exist.<sup>81</sup>

---

<sup>79</sup> Richard G. Davis, *Carl A. Spaatz and the Air War in Europe* (Washington, DC: Center of Air Force History, 1993), 179, Chart 3.

<sup>80</sup> Davis, *Carl A. Spaatz*, 179, Chart 3.

<sup>81</sup> Headquarters Northwest African Air Forces, General Order no. 1, 18 February 1943, HRA Call no. 612.201-1, IRIS no. 242265, in USAF Collection, AFHRA, 1.



**Figure 3. Mediterranean Air Command, February 1943**

Source: Reprinted from Richard G. Davis, *Carl A. Spaatz and the Air War in Europe*

The reorganization of Allied air forces allowed air planners to implement a coordinated air campaign; one that provided not only increased operational, but also tactical flexibility. With air superiority as the priority, air planners embraced an offensive outlook that dominated the employment of Allied air assets. As a result of the experiences employing air power in North Africa, airmen developed a theory of air power that eventually led to the publication of FM 100-20, *Command and Employment of Air Power* (21 July 1943). This document directed that “the gaining of air superiority is the first requirement for the success of any major land operation”<sup>82</sup> It further stipulated that “air forces must be

<sup>82</sup> War Department Field Manual (FM) 100-20, *Command and Employment of Air Power* (Washington, DC: U.S. Government Printing Office, 1944), 1.

employed primarily against the enemy's air forces until air superiority is obtained.”<sup>83</sup> As such, FM 100-20 established three air power priorities for planning air campaigns: (1) air superiority with directed attacks against enemy aircraft in the air and on the ground, (2) aerial interdiction, and (3) a combined air and ground effort to support objectives to their immediate front of ground forces in the main battle area.<sup>84</sup> FM 100-20 set the precedence for parity between ground and air commanders. Unity of command required one army officer to be responsible for all ground forces and one airman to be responsible for all air operations.<sup>85</sup>

### **Air Superiority during Operation TORCH**

Operation TORCH demonstrated the weaknesses of the initial air plan. The Allies were unable to employ the *full force* of their numerically superior air assets against the Axis forces. The implementation of separate air forces conducting independent operations, frustrated by lack of airfields, and poor weather, led to an uncoordinated air effort in providing theater support. Furthermore, the gross misuse of Allied airpower in Northwest Africa enabled the numerically inferior *Luftwaffe* to secure local air superiority and successfully attack Anglo-American ground troops on a frequent basis. Less than a month after the Allied landings, the advance on Tunisia had slowed to a virtual halt. General Eisenhower was learning the hard way that victory on the ground depended in large measure on the effective employment of airpower.

F.H. Hinsley wrote, the “British forces in North Africa were supplied with more information about more aspects of the enemy's operations than any forces enjoyed during any important campaign of the Second

---

<sup>83</sup> FM 100-20, 1.

<sup>84</sup> FM 100-20, 10-11.

<sup>85</sup> FM 100-20, 2.

World War.”<sup>86</sup> Yet, as illustrated in the early weeks of TORCH, intelligence alone does not adequately determine the outcome of battle.<sup>87</sup> Despite the accurate picture ULTRA provided on the GAF and the Axis air forces, Allied air forces were unable to take full advantage.

Radar operations stumbled in the opening assault on North Africa in November 1942, but recovered in the subsequent months to provide an effective defense, both with early warning and aerial interdiction of enemy aircraft. In addition, the limited number of airfields and the lack of logistical support restricted the number of Allied aircraft in the forward combat area.

In a comparison of sorties flown on the Tunisian front from 22 – 30 November, an estimated 1,710 sorties were flown by the Eastern Air Command with at least 45 aircraft lost. The Twelfth Air Force lost at least seven aircraft for about 180 sorties. In contrast, the *Luftwaffe* flew 1,084 sorties with 63 losses, and the Italians recorded four aircraft losses.<sup>88</sup>

Despite the impact of weather on air operations, in the first two weeks of December (1 – 12), the Eastern Air Command flew 2,225 sorties and recorded at least 37 aircraft lost. The Twelfth Air Force flew 523 sorties and lost just 17 aircraft. During this same period, the *Luftwaffe* lost 37 aircraft for 1,000 sorties and the Italian lost ten aircraft to Allied attacks.<sup>89</sup> The second two weeks (13 – 26) the losses reported by Eastern Air Command were 20 aircraft for 1,940 sorties and the Twelfth flew 720 sorties with 16 aircraft losses. The Axis air forces reported 20 aircraft losses for 1,030 sorties, including three Italian aircraft.<sup>90</sup>

---

<sup>86</sup> Hinsley, et al., *British Intelligence*, Vol. II, 380; Ralph Bennett, *Intelligence Investigations: How Ultra Changed History* (London: Frank Cass, 1996), 17. Bennett makes a similar assertion as to the value of ULTRA between June 1942 and the surrender of the German forces in May 1943.

<sup>87</sup> Robert C. Ehrhart et al., “Building an Air Intelligence Organization”, 158; Brad William Gladman, *Intelligence and Anglo-American Air Support in World War Two: The Western Desert and Tunisia, 1940-1943* (New York: Palgrave Macmillan, 2009), 159.

<sup>88</sup> Playfair, *Mediterranean and the Middle East*, 179.

<sup>89</sup> Playfair, *Mediterranean and the Middle East*, 186.

<sup>90</sup> Playfair, *Mediterranean and the Middle East*, 189.

The command structure in place for Operation TORCH compounded the logistical disadvantages of substandard Allied airfields. Through the fragmentation of available Allied air assets, the *Luftwaffe* had *de facto* air superiority.<sup>91</sup> In contrast to operations conducted by the WDAF in the Middle East, air operations for TORCH violated the WDAF's principles of airpower—unity of command and flexibility of action (i.e. centralized command and decentralized execution). In Northwest Africa the Allied air forces were subordinate to the land forces. TORCH planners ignored the hard-earned lessons learned by the RAF in the Middle East. Instead the air plan was based on the untried air doctrine outlined in Field Manual (FM) 31-35, *Aviation in Support of Ground Forces*, which dictated much of the air-ground policy; relinquishing operational control of the supporting air forces to Army and corps commanders. Further frustrating the air plan was the lack of liaison between the two air forces leaving the Eastern Air Command and Western Air Command (Twelfth Air Force) to form their respective air plans without reference to each other. The principle of unity of command, exercised by the WDAF, would later be codified in FM 100-20, which instituted parity between ground and air commanders and set a precedent for future air operations. The Allied Air Force, employing the principle of unity of command and flexibility of action, would be vindicated during Operation HUSKY and the invasion of Sicily.

---

<sup>91</sup> Robert C. Ehrhart et al., "Building an Air Intelligence Organization", 160.



### Chapter 3

#### Tunisian Campaign and Operation HUSKY

*Sir, it is my duty to report that the Tunisian campaign is over. All enemy resistance has ceased. We are masters of the North African shores.*

— Lt General Kenneth A.N. Anderson,  
Message to Churchill, 13 May 1943

*Allied air forces had complete mastery of the air [and] the Axis air force ceased to exist . . . the battle in Sicily would have to be fought without any air support.*

— Colonel Bogislaw von Bonin,  
*Battle for Sicily*

#### A New Commander, a New Approach

At this juncture of the campaign, although the “Allies had gained air superiority numerically” the lack of progress by ground and air forces in the theater indicated that the potential inherent in numerical superiority was not being utilized.”<sup>1</sup> The lack of coordination between the AAF and RAF during the early phases of the North African campaign resulted in “Allied air and ground forces [achieving] neither air superiority nor satisfactory teamwork. Consequently, from November 1942 through mid-February 1943, Allied close air support was ineffective.”<sup>2</sup> Prior to the creation of the Mediterranean Air Command, the consolidation of Allied air forces into the Northwestern African Air Force (NAAF), and the implementation of the principles of air power

---

<sup>1</sup> History of the Twelfth Air Force, Vol. I (Draft), HRA Call no. 650.057-3, IRIS no. 245172, in USAF Collection, AFHRA, Ch. 10, 25.

<sup>2</sup> Richard G. Davis, *Carl A. Spaatz and the Air War in Europe* (Washington, DC: Center of Air Force History, 1993), 121.

established by the Royal Air Force (RAF) in the Western Desert, the enemy never felt the full weight of Allied air strength.<sup>3</sup>

The reorganization of the Mediterranean air forces, with the subsequent shifting of units, along with the weather and the fact that some units were considerably under strength, caused a noticeable lull in air activity from the end of February until mid-March. The air strength of the NAAF for the March offensive consisted of 319 aircraft assigned to Northwestern African Tactical Air Force (NATAF) and 383 aircraft assigned to Northwestern African Strategic Air Force (NASAF), as compared to the Axis with a total of 395 aircraft. The majority of the German Air Force (GAF)—175 aircraft—was based in the north, dispersed between Tunis and Bizerte. In the south, the GAF assigned 180 aircraft, the majority of which were fighters (130); the remaining air forces were assigned to central Tunisia.<sup>4</sup>

Air Marshal Coningham arrived to take command of NATAF on 18 February and assumed direct command of all tactical air units (No. 242 Group, RAF; and XII Air Support Command (ASC), Army Air Force). He immediately changed the air support arrangements and ended the flawed and harmful practice of land commanders controlling aircraft. He discontinued methods prescribed in FM 31-35 and replaced them with his own WDAF organization and system of command. The emphasis for air operations transitioned from maintaining “an umbrella over the front by fighters and disrupting enemy supply lines by bombers to defeating the enemy air as the first priority mission of the entire air force.”<sup>5</sup>

---

<sup>3</sup> History of the Twelfth Air Force, Vol. I (Draft), Ch. 9, 15.

<sup>4</sup> History of the Twelfth Air Force, Vol. I (Draft), Ch. 10, 28; in the Tunis-Bizerte area, the GAF had 125 fighters (FW 190s, ME 109s, and M202s). The GAF had 130 fighters in the south and 40 fighters (FW 190s and M202s) in the central sector. The remaining 100 aircraft were a mixture of dive bombers, fighters, and fighter-bombers of various types.

<sup>5</sup> History of the Twelfth Air Force, Vol. I (Draft), Ch. 10, 25.

## **The Offensive in Tunisia**

The fundamental premise of the new program to be applied in Tunisia was centralized control. Under Coningham, control over tactical air units was centralized, and missions were assigned by a commander with full cognizance of their capabilities and ability to determine priorities among competing requests. The offensive use of Allied air under this system promised cumulative results beneficial to Allied ground and air elements alike. Air umbrellas over ground troops were abandoned in favor of strikes on the bases from which enemy flights originated. In this system, no operational air unit would remain unemployed or be sent to a minor target. Coningham emphasized that the first priority was the establishment of air superiority; the second was the isolation of the immediate battlefield.<sup>6</sup>

The combined Allied offensive operations that began in earnest on 17 March 1943 offered the Allied air forces their first opportunity for large scale, concerted action under the newly organized NAAF.<sup>7</sup> The directives to the participating air forces clearly indicate the emphasis of the operations. The first duty of the air forces was to defeat enemy air “by fighter sweeps and intensive bombardment of the airfields from which the enemy was expected to operate.”<sup>8</sup> Once air superiority was gained, the next responsibility “was furnishing visual and photographic reconnaissance in the battle area. Then the air could divert available strength to strikes in the battle zone, attacking enemy ground targets.”<sup>9</sup>

The ultimate objective of the Tunisian campaign was “to destroy or capture the entire Axis forces in North Africa in order to prohibit their participation in future campaigns.”<sup>10</sup> To accomplish this objective the

---

<sup>6</sup> George F. Howe, *Northwest Africa: Seizing the Initiative in the West* (Washington, DC: Center Of Military History, 1993), 493.

<sup>7</sup> History of the Twelfth Air Force, Vol. I (Draft), Ch. 10, 24.

<sup>8</sup> History of the Twelfth Air Force, Vol. I (Draft), Ch. 10, 25.

<sup>9</sup> History of the Twelfth Air Force, Vol. I (Draft), Ch. 10, 25.

<sup>10</sup> History of the Twelfth Air Force, Vol. I (Draft), Ch. 10, 3.

offensive against the Axis forces in Tunisia “was to be a combined attack by the forces on the south, the Eighth Army and the Western Desert Air Force, and the forces on the west, the First Army and the Tunisia-based units of Northwest African Air Forces.”<sup>11</sup> NAAF, and especially XII ASC, would carry out coordinated attacks to obtain and maintain air superiority over enemy air forces in order to allow complete freedom of action by the WDAF in direct support of the Eighth Army. In addition, XII ASC was to protect the forward movement by II Corps, while RAF No. 242 Group was to be active in the North gaining and maintaining fighter superiority over enemy aircraft based in the Tunis area.<sup>12</sup>

As Clausewitz cautioned, “War; however, is not the action of a living force upon a lifeless mass . . . but always the collision of two living forces”<sup>13</sup>. On 14 February 1943 Field Marshal Erwin Rommel executed a counter offensive, and between 19 and 21 February the American forces appeared to have been routed and in full retreat—being driven westward by Axis forces in the Kasserine Pass, Tunisia. The tide turned on 22 February as Rommel’s forces, likely suffering from a severe shortage of ammunition and fuel, were forced to execute their own retreat eastward through the Kasserine Pass—pressed closely by punishing ground and air attacks meant to expedite the retreat.<sup>14</sup>

With the Axis forces in retreat, Spaatz and his subordinate commanders, within the broad objectives assigned by higher headquarters, switched their focus to meet the changing theater situation by striking airfields and ports in Tunisia, ships at sea, and

---

<sup>11</sup> History of the Twelfth Air Force, Vol. I (Draft), Ch. 10, 18.

<sup>12</sup> History of the Twelfth Air Force, Vol. I (Draft), Ch. 10, 19-20.

<sup>13</sup> Carl von Clausewitz, *On War*, trans. and ed. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1984), 77.

<sup>14</sup> History of the Twelfth Air Force, Vol. I (Draft), Ch. 10, 3; NAAF, *Air Intelligence Report*, No. 105, MICFILM Call no. 25220, IRIS no. 2007240, 23 February 1943 in USAF Collection, AFHRA; Douglas Porch, *The Path to Victory: The Mediterranean Theater in World War II* (New York: Farrar, Straus and Giroux, 2004), 387-389.

ports and airfields in Sicily, Sardinia, and Italy.<sup>15</sup> Units from NATAF and NASAF also began conducting close support and interdiction missions against retreating columns and railroad yards.<sup>16</sup> There were a number of extenuating circumstances leading to the extreme logistical vulnerability of the Axis forces. The ground and air forces were completely dependent on the lines of communication for the transportation of supplies between the European mainland and the deserts of Africa. This was only exacerbated by the limited number of ports of debarkation, the shortage of ships and shipping lanes, and the scarcity of air fields for air transport aircraft. The ability of the Allied intelligence organization to break Axis codes “enabled precise tracking of supply convoys and routes, [and] added immeasurably to the ease with which Allied air power could locate and attack the many weaknesses in the Axis logistical network.”<sup>17</sup>

In a separate air effort, code named Operation FLAX, Air Marshal Coningham devised plans to end the extensive use of air transports by the Axis forces to supplement personnel and supplies from staging areas in Sicily across the strait to Tunisia. In the early weeks of April 1941 the Allied Air Forces’ interdiction efforts effectively crippled the Axis ability to re-supply ground forces and severely limited the operational capability of the *Luftwaffe*.

As with the initial invasion of North Africa, airfields situated in forward areas from which fighters would operate were “regarded as the highest importance to the successful conduct of the final phases of the Tunisian campaign.”<sup>18</sup> NAAF required access to airfields near the front lines to support the First Army as it pushed Rommel’s forces west to east

---

<sup>15</sup> Denis Richards and Hilary St. G. Saunders, *The Royal Air Force, 1939-1945, Vol. II, The Fight Avails* (London: HMSO, 1954), 301; Robert C. Ehrhart, Thomas A. Fabyanic, and Robert F. Futrell, “Building an Air Intelligence Organization and the European Theater”, in *Piercing the Fog: Intelligence and Army Air Forces Operations in World War II*, ed. John F. Kreis (Washington, DC: Air Force Historical Studies Office, 1996), 163.

<sup>16</sup> History of the Twelfth Air Force, Vol. I (Draft), Ch. 10, 8.

<sup>17</sup> Richard G. Davis, *Carl A. Spaatz and the Air War in Europe*, (Center of Air Force History: Washington, DC, 1993), 121.

<sup>18</sup> History of the Twelfth Air Force, Vol. I (Draft), Ch. 10, 12.

and the II Corps and Eighth Army moved north and northeastward.<sup>19</sup> In the spring of 1943, time seemed to be running out for the Axis forces in Tunisia. The Eighth Army had made contact with the II US Corps and was driving the enemy northward,<sup>20</sup> while “*Luftwaffe* strength had been reduced by half to 178 aircraft, [and] the Italians could muster only 65 against almost 3,000 Allied planes. The Allied advance had overrun many airfields, which made the Axis air effort practically powerless. The massive Allied air buildup now operated from close-in, all-weather runways.”<sup>21</sup>

The period from January 1943 until the final surrender of Axis forces in North Africa reflected the versatility and flexibility of air power. The Allied air forces gained local if not complete air superiority in Tunisia, where “previously, the German Air Force had ranged almost at will over the entire battle area as well as in the rear areas.”<sup>22</sup>

On 13 May 1943, the very same day that the Combined Chiefs of Staff approved the assault locations for Operation HUSKY, the Germans surrendered in Tunisia, and the air planners began final preparations for the invasion of Sicily.<sup>23</sup> The Allied forces were now “masters of the North African shores.”<sup>24</sup>

---

<sup>19</sup> History of the Twelfth Air Force, Vol. I (Draft), Ch. 10, 13.

<sup>20</sup> History of the Twelfth Air Force, Vol. I (Draft), Ch. 10, 24

<sup>21</sup> Porch, *The Path to Victory*, 406-407.

<sup>22</sup> History of the Twelfth Air Force, Vol. I (Draft), Ch. 10, 25. Field Marshal Bernard Montgomery also testified to the degree of Allied superiority in air in the spring of 1943 in his memoir *El Alamein to the River Sangro*. He writes, “Our air superiority was virtually complete, and we were never bothered by enemy air action”, 87.

<sup>23</sup> Wesley Frank Craven and James Cate, eds., *The Army Air Forces in World War II. Vol. II, Europe: TORCH to POINTBLANK* (New York: University of Chicago Press, 1950), 416.

<sup>24</sup> Lt General Kenneth A.N. Anderson, quoted in I.S.O Playfair, et al., *The Mediterranean and the Middle East, Vol. IV: The Destruction of the Axis Forces in Africa* (London: HMSO, 1966). 459.



## **Operation HUSKY: Strategic Decisions**

In the months prior to Operation TORCH, the strategy in the Mediterranean was characterized by defensive actions and reaction to Axis movements. Yet, by January 1943, when the Allied leaders convened the Casablanca Conference, the balance had shifted. For the first time since the decision to execute TORCH, the Allies had a considerable degree of freedom in selecting their next objective.<sup>25</sup> There were, however, differences in opinion between the Allied planning staff as to the next action after TORCH. The most contentious issue revolved around the need for a continuing strategy in the Mediterranean. Believing that the Mediterranean was merely a distraction, Americans argued for the original strategy of operations against Europe. The British, however, asserted that an invasion of the European continent could not be undertaken until Germany was sufficiently weakened. Both agreed that further operations in the Mediterranean would require a substantial investment in resources, thereby ensuring that any cross-Channel operations would be unlikely in 1943.<sup>26</sup>

Despite their differences in strategy, the British and Americans reached an agreement on 18 January 1943 to maintain the initiative in the Mediterranean by invading Sicily following completion of the Tunisian campaign. The objectives for Sicily were primarily contingent on the ability of the Allied air forces to obtain air superiority and, secondarily, the ability to capture and hold key ports to off load supplies and equipment. There were 19 known enemy airfields in Sicily, divided into three groups: west at Castelvetro, east of Gerbini, and southeast of Gela. The latter two groups were mutually supporting airfields and vital to air operations in Sicily. The port of Messina, on the northern coast, was the most important objective on the island because of its location

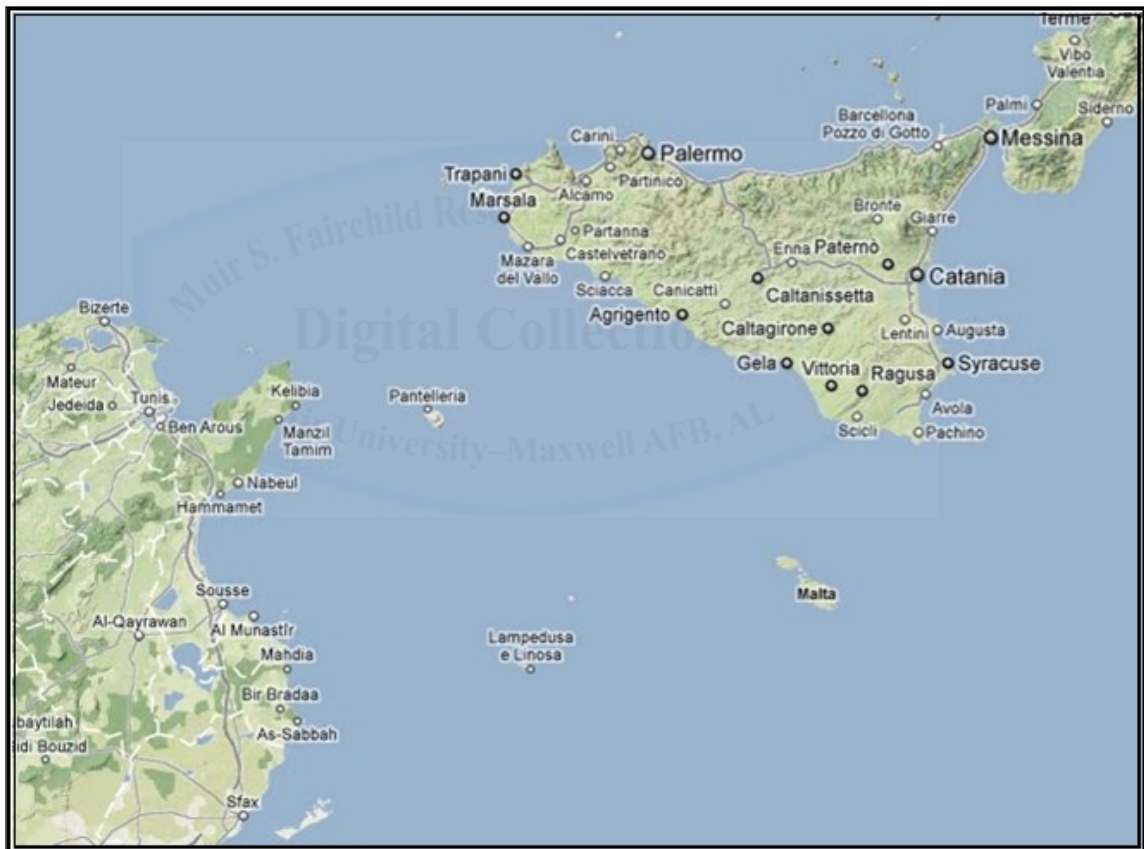
---

<sup>25</sup> Lieutenant Colonel Albert N. Garland and Howard McGraw Smyth, *Sicily and the Surrender of Italy* (Washington, DC: Center of Military History, 1993), 1.

<sup>26</sup> Maurice Matloff, *Strategic Planning for Coalition Warfare: 1943-1944* (Center of Military History, United States Army: Washington, DC, 1991), 23; Garland and Smyth, *Sicily*, 9.



directly due west across the straits from Italy (Figure 4); however, due to the lack of control of the strait and the distance from secure bases for fighter support, it was untenable as a primary objective for Operation HUSKY.<sup>27</sup> The capitulation of Sicily ensured the security of Mediterranean shipping and offered an advantage in reach by air to the Continent. It also had the immediate effect of containing the maximum number of German forces while effectively eliminating Italy from the war.<sup>28</sup>



**Figure 4. Map of Sicily, Pantelleria, and Malta**

Source: Google Maps

## The Air Plan

<sup>27</sup> RAF Narrative (First Draft), *The Sicilian Campaign, June-August 1943*, HRA Call no. 512.041-58, IRIS no. 895773, in USAF Collection, AFHRA, 4; Richards, Denis, et al., *The Royal Air Force, 1939-1945, Vol. II*, 297-298.

<sup>28</sup> Garland and Smyth, *Sicily*, 10, 23.

Building on the lessons learned in Tunisia, the Allied air plan was designed around five primary missions: (1) destroy or neutralize enemy air forces, (2) preparation of the battlefield, (3) support of the assault forces and convoys, (4) disrupt enemy lines of communications, and (5) support airborne operations. More specifically, the air plan consisted of four phases: (1) preparatory operations, (2) assault phase, (3) attack on Catania, and (4) reduction of the remainder of Sicily.<sup>29</sup> Operation HUSKY called first and foremost for the newly organized air forces to gain air supremacy by neutralizing Axis air forces and their airfields.

Northwest African Tactical Air Force (NATAF) assumed planning responsibility for employing tactical air forces, while NASAF planned strategic operations. For planning purposes, Operation HUSKY was divided into Task Force East (Force 545), headquartered in Oran and Task Force West (Force 343), with headquarters in Cairo, Egypt.<sup>30</sup> Based on the experiences gained in Tunisia and the Western Desert campaigns, the air plan did not assign air assets to specific sectors or landing zones. To exploit the inherent flexibility of NAAF operations, units of either air force could be placed under the operational control of the other, as the situation dictated.<sup>31</sup> Air Marshal Coningham, concerned about treating the two assault task forces as separate entities, convinced Spaatz to allow NATAF to exercise control over all tactical air operations to optimize available air assets.<sup>32</sup> Although organizationally NAAF depicted a distinct division between tactical and strategic operations, directly or indirectly, “the function of NAAF was almost exclusively tactical in nature; . . . its mission was one of cooperation in land and amphibious operations. . . . to further the advance of land and sea forces . . . [with

---

<sup>29</sup> Harry L. Coles, Jr., *Participation of the Ninth and Twelfth Air Forces in the Sicilian Campaign*, USAF Historical Study No. 37. (Maxwell AFB, AL: USAF Historical Division, Air University, 1955), HRA no. 101-37, IRIS no. 467628, in USAF Collection, AFHRA, 20-21.

<sup>30</sup> Coles, *Participation of the Ninth and Twelfth Air Forces*, 19.

<sup>31</sup> Craven and Cate, *TORCH to POINTBLANK*, 445.

<sup>32</sup> Coles, *Participation of the Ninth and Twelfth Air Forces*, 17.

less emphasis] on [striking] directly at the enemy's capacity to wage war."<sup>33</sup>

All told, Operation HUSKY air planners had nearly 5,000 operational aircraft at their disposal compared to the 1,500–1,600 Axis aircraft based in Sardinia, Sicily, and southern Italy. The AAF supplied the majority of day bombers and troop transports, while the RAF supplied the majority of fighters and the entire night bomber force.<sup>34</sup> The bulk of the Axis air force, based in Sicily and Italy, consisted of 360 fighters and 225 German long-range bombers, with a reserve force in Greece, Crete, the Dodecanese, northern Italy, and southern France.<sup>35</sup>

Preparatory operations for the capture of Sicily included Operation CORKSCREW— capturing the island of Pantelleria and its critical airfield. The acquisition of the airfields in Pantelleria, almost equidistant from Tunisia and Sicily, was the critical first step to acquiring the necessary basing for fighter support for further operations northward in the Mediterranean. The operational radius of the Allied fighters was a significant concern of the Allied planners. The Spitfire, for example, was limited by a 90-mile radius and at this range its pilots could only remain over the battlefield for 5-10 minutes.<sup>36</sup> The island was subjected to heavy Allied bombardment well in advance of the assault on Sicily. The air attacks, supplemented by naval bombardment, eliminated nearly all enemy resistance.

The air operation against Pantelleria demanded “freedom from interference by the Axis air arm and maximum interdiction of supplies and reinforcements for the enemy.”<sup>37</sup> To allow Allied aircraft to operate freely over the Sicilian Straits and the Eastern Tunisian plains, airmen

---

<sup>33</sup> Wesley Frank Craven and James Cate, eds., *The Army Air Forces in World War II. Vol. II, Europe: TORCH to POINTBLANK*, (New York: University of Chicago Press, 1950), 418; RAF Narrative (First Draft), *The Sicilian Campaign*, 31.

<sup>34</sup> Craven and Cate, *TORCH to POINTBLANK*, 445.

<sup>35</sup> Coles, *Participation of the Ninth and Twelfth Air Forces*, 75.

<sup>36</sup> Craven and Cate, *TORCH to POINTBLANK*, 89.

<sup>37</sup> Craven and Cate, *TORCH to POINTBLANK*, 434-435.

eliminated German radar direction-finding [RDF] stations on Pantelleria. With the air and ground forces effectively blinded to the approaching Allied Air Force, the enemy's air assets were damaged or destroyed while still on the ground. Pantelleria surrendered "after a few rounds of small arms fire were exchanged with the landing forces on 11 June."<sup>38</sup> On 13 June, Lampedusa and Linosa, smaller islands to the south, also fell, along with Lampione on the following day.<sup>39</sup> The capture of Pantelleria "was one of the principal contributions of the air forces in the ultimate victory of Sicily"<sup>40</sup> and "marked the first successful Allied effort to conquer enemy territory principally by air action."<sup>41</sup> "During the period of 8 May to 11 June, the day of the surrender, [NAAF] flew 5,258 sorties with a loss of only four aircraft destroyed, 10 missing and 16 damaged."<sup>42</sup> Besides the tactical advantage derived from the capture of Pantelleria, it also served as a dress rehearsal and confirmation of tactics to be used by the Allies as they moved northward—amphibious assaults, preceded by increasingly intensive air attacks by land-based aircraft.<sup>43</sup>

Another strategic outpost for the successful invasion of Sicily was the island of Malta, just off the southern coast. This island, due to its strategic importance, had become the "most besieged island in the world, [but] by the spring of 1943 it had been transformed into an effective base for offensive operations against the Axis."<sup>44</sup> The existing RDF stations were upgraded and additional stations were installed to support ground controlled intercept for fighter units. Malta served as basing for more than 26 squadrons of first-line aircraft providing fighter escorts and diversion for attacks operating within a 100-mile radius of the island, as

---

<sup>38</sup> Matloff, *Strategic Planning for Coalition Warfare: 1943-1944*, 150.

<sup>39</sup> Coles, *Participation of the Ninth and Twelfth Air Forces*, 41.

<sup>40</sup> Coles, *Participation of the Ninth and Twelfth Air Forces*, 41.

<sup>41</sup> Matloff, *Strategic Planning for Coalition Warfare: 1943-1944*, 150.

<sup>42</sup> Coles, *Participation of the Ninth and Twelfth Air Forces*, 41.

<sup>43</sup> Craven and Cate, *TORCH to POINTBLANK*, 434.

<sup>44</sup> Coles, *Participation of the Ninth and Twelfth Air Forces*, 54.

well as offensive operations against southern Sicilian airfields occupied by Axis forces.<sup>45</sup>

As with Pantelleria, the air plan for Operation HUSKY called for bombing, strafing, and jamming of German radar stations along the eastern and western coasts of Sicily and in Sardinia in the weeks prior to the invasion.<sup>46</sup> Besides enemy airfields, other selected targets included prominent supply points, terminal ports and marshalling yards to block efforts to reinforce Sicily. NAAF *Operational and Intelligence Summaries* report that enemy fighter resistance was minimal after 6 July 1943. There was “almost a complete lack of enemy fighter reaction” on missions over eastern Sicily.”<sup>47</sup> Any opposition encountered during missions over Sicily and Sardinia refused to confront Allied air forces or attacked in minimal strength; evidenced by the low number of enemy claims on after action reports and intelligence summaries. It appeared that it was the *Luftwaffe’s* “intention to conserve his Sicilian-based air strength”.<sup>48</sup>

### **Amphibious Assault on Sicily**

The assault force for Operation HUSKY called for eight simultaneous amphibious assaults—the largest single operation to date—along 100 miles of the southeastern coastline of Sicily. Field Marshal Bernard Montgomery led the Eastern Task Force (Eighth Army) assault against the southeastern coast while Major General George S. Patton led the Western Task Force (Seventh Army) along the southern coast of Sicily, just west of Montgomery’s position.<sup>49</sup>

On 9-10 July the 82nd Airborne Division, aboard AAF transports, and the glider-borne British First Airborne Division attempted to capture

---

<sup>45</sup> Preliminary Report on Husky Operations by Malta-based Aircraft, Air Hq., Malta, 68-A, cited in Coles, *Participation of the Ninth and Twelfth Air Forces*, 54-55; Craven and Cate, *TORCH to POINTBLANK*, 437.

<sup>46</sup> NAAF, *Operational and Intelligence Summaries*, Nos. 131-141, HRA call no. 622.011, IRIS no. 200741, 1-11, July 1943, in USAF Collection, AFHRA.

<sup>47</sup> NAAF, *Operational and Intelligence Summaries*, No. 137.

<sup>48</sup> NAAF, *Operational and Intelligence Summaries*, No. 139.

<sup>49</sup> Matloff, *Strategic Planning for Coalition Warfare: 1943-1944*, 150; Porch, *Path to Victory*, 418-419.

strategic targets ahead of the main amphibious invasion.<sup>50</sup> Although neither force was intercepted by enemy air, high winds and navigational errors resulted in less than perfect results. Only 12 gliders of the 137 released on that night found their target, with 69 gliders landing in the sea. The remaining 56 gliders were dispersed along the coast of southern Sicily.<sup>51</sup> The results from the air transports paralleled that of the gliders, as the 82nd Airborne was scattered across the drop zone, many unable to form up with their units upon landing.<sup>52</sup> In a subsequent airborne operation on 11 July, paratroops were once again scattered across the drop zone. The operation suffered from heavy losses in both personnel and aircraft as a result of heavy machine gun fire and flak from enemy forces and, unfortunately, friendly ground and naval forces as well.<sup>53</sup>

The full force of the Mediterranean Air Command was brought to bear in the invasion of Sicily. Units from NAAF, RAF Middle East and RAF Malta conducted escort missions for the bomber force as well as escorts for the assault convoys as they transitioned from North Africa, past Malta, and on to the Sicilian coasts. Although sufficient fighter strength was available, the ability to adequately support the entire assault mission was limited by “(1) the operational capacity of the airfields on Malta and Pantelleria, (2) the long distances from the operating fields to the assault areas and the resulting short time of cover provided by each sortie, and (3) the large commitment of fighter escorts.”<sup>54</sup> Nonetheless, Spitfires and P-40s flew 1,092 sorties in support

---

<sup>50</sup> Coles, *Participation of the Ninth and Twelfth Air Forces*, 79; Porch, *Path to Victory*, 419. The 82nd Airborne operation was code named HUSKY No. 1, while the British First Airborne operation was code named LADBROKE.

<sup>51</sup> Richards, Denis, et al., *The Royal Air Force, 1939-1945, Vol. II, The Fight Avails*, 309; RAF Narrative (First Draft), *The Sicilian Campaign*, 46.

<sup>52</sup> Memo for General Arnold by Maj Gen Clayton Bissell, AC/AS, Intelligence, *Report of Allied Force Airborne Board*, 5 November 1943; Military Reports on the United Nations No. 11, 15 October 1943 cited in Coles, *Participation of the Ninth and Twelfth Air Forces*, 82-86.

<sup>53</sup> Coles, *Participation of the Ninth and Twelfth Air Forces*, 89.

<sup>54</sup> “Action Report of the Western Naval Task Force in the Sicilian Campaign” cited in Coles, *Participation of the Ninth and Twelfth Air Forces*, 102.



of naval operations, with only 12 ships lost to enemy air attack.<sup>55</sup> On 10-12 July Spitfires and P-40s claimed 188 enemy fighters destroyed, probably destroyed or damaged, with only 13 Allied losses.<sup>56</sup> The Allied forces had complete air superiority during the convoy escorts as the “enemy made no attempt to attack the [assault] convoys while en route to their destination.”<sup>57</sup>

### **The Role of Intelligence**

The establishment of NAAF fundamentally changed the employment of air power in the Mediterranean. A benefit of the reorganization of air forces was the improved coordination of air intelligence in the theater. The handling and use of air intelligence in North Africa also underwent a manifest change. Prior to the creation of NAAF, the Allied Forces Headquarters (AFHQ) G-2 was the focal point of all intelligence. Targets and the air forces to be employed against them were determined at a daily meeting at AFHQ.<sup>58</sup> With the recommendation of the chief intelligence officer, and with the concurrence from General Spaatz, NAAF established a full intelligence section incorporating combat intelligence, target intelligence, POW interrogations, counterintelligence, ‘Y’-Service, and ULTRA.<sup>59</sup> The NAAF Intelligence Division was to be the centerpiece of air intelligence in the theater—responsible for monitoring the condition and activities of enemy air forces, providing intelligence inputs to target selection, preparing and disseminating intelligence summaries and reports, handling captured

---

<sup>55</sup> Coles, *Participation of the Ninth and Twelfth Air Forces*, 105.

<sup>56</sup> “Report of the Northwestern African Air Forces in Operation Husky”, 4 cited in USAF Historical Study No. 37, *Participation of the Ninth and Twelfth Air Forces*, 110.

<sup>57</sup> Coles, *Participation of the Ninth and Twelfth Air Forces*, 99.

<sup>58</sup> Group Captain R. H. Humphreys, “The Use of ‘U’ in the Mediterranean and Northwest African Theatres of War, Oct 1945,” in *Reports Received by U.S. War Department on the Use of ULTRA in the European Theater in World War II*, Special Research History (SRH)-037, HRA Call no. 160.032-27, IRIS no. 1032654, in USAF Collection, AFHRA, 28; Craven and Cate, *TORCH to POINTBLANK*, 120-121.

<sup>59</sup> Humphreys, “Use of ‘U,’” SRH-037, 28.



intelligence (including POW reports), and coordinating photoreconnaissance requests and result.<sup>60</sup>

To improve intelligence dissemination in the theater, NAAF employed mechanisms such as the *Air Intelligence Report*, the *Daily Intelligence Summary* and the *Weekly Intelligence Report*. These reports provided condensed summaries of enemy air and ground situations and activities. Equally valuable was the information on trends in enemy tactics. Intelligence reports included comments from Allied pilots, gleaned from after action reports, as well as *Luftwaffe* POWs on tactics within German fighter units.<sup>61</sup>

The tools of air intelligence played a significant role in NAAF air planning, and General Spaatz ensured that his staff had access to all available intelligence functions required for detailed planning.<sup>62</sup>

Persistent aerial photography of proposed targets was a basic requirement for effective planning and operations.<sup>63</sup> On 1 March, in preparation for Operation HUSKY, a detachment of the 12th Photo Reconnaissance Squadron was assigned to Malta to assist the RAF 246 Wing in mapping the entire island of Sicily. An estimated 500 photo reconnaissance missions were flown in support of intelligence collection for the preparation for the invasion.<sup>64</sup> In the days prior to assault on Sicily, photo reconnaissance “indicated that approximately one-half of

---

<sup>60</sup> Lt Col P. M. Barr, Office of AC/AS, Intelligence, HQ AAF, “Survey of Air Intelligence in North West African Theater, February 12-April 13, 1943”, HRA call no. 142.0471-2, IRIS no. 115491, in USAF collection, AFHRA, 5.

<sup>61</sup> Humphreys, “Use of ‘U,’” SRH-037, 28; NAAF, *Air Intelligence Report*, Nos. 15-155, January-April 1943, MICFILM Call no. 25220, IRIS no. 2007240, in USAF Collection, AFHRA, 28; NAAF, *Operations and Intelligence Summary*, No. 68, 29 April 1943, MICFILM Call no. 25221, IRIS no. 2007241, in USAF Collection, AFHRA, 7; NAAF, *Weekly Intelligence Summaries*, No. 21, 20 February-23 April 1943, HRA Call no. 612.607, IRIS no. 242393, in USAF Collection, AFHRA, 14.

<sup>62</sup> Robert C. Ehrhart et al., “Building an Air Intelligence Organization”, 161; Richard G. Davis, *Carl A. Spaatz and the Air War in Europe* (Center of Air Force History: Washington, DC, 1993), 144.

<sup>63</sup> RAF Narrative (First Draft), *The Sicilian Campaign*, 30.

<sup>64</sup> Preliminary Report on Husky Operations by Malta-based Aircraft, Air Hq., Malta, cited in Coles, *Participation of the Ninth and Twelfth Air Forces*, 55; Interview of Colonel Elliot Roosevelt, AAF, Commanding Officer, Photo Reconnaissance Wing, NAAF, 30 July 1943. Typed transcript, HRA Call no. 650.03-4, IRIS no. 245167, in AFHRA collection.

the enemy air force had been driven out of Sicily and forced to seek shelter elsewhere.”<sup>65</sup>

During Operation FLAX intelligence sources played a critical role in the understanding the extent of the Axis air transports supporting the air bridge from Sicily to Tunisia. Information gleaned from ULTRA permitted tracking these movements by radar and photo reconnaissance assets. The culmination of this coordinated effort was realized on 10 April, twenty miles off the coast of Cap Bon, Tunisia. In a crippling aerial engagement, 25 P-38s from the 1st Fighter Group intercepted a formation of 50 Junkers (Ju) 52 transports and a mix of 15 fighter escorts. The Allied fighters claimed 20 transports and eight fighters with no losses of their own.<sup>66</sup> A follow-up performance by the WDAF on 18 and 19 April resulted in the destruction of 70 Ju 52 transports—the single highest loss of *Luftwaffe* transport aircraft in an aerial engagement to date.<sup>67</sup>

To support the planning and organization of Operation HUSKY, the air intelligence sections were also responsible for identifying vulnerable points, namely road and railway systems, in Sicily that upon destruction would delay enemy movements during the assault phase.<sup>68</sup> Using this information, updated primarily by photographic reconnaissance and ‘Y’ intercepts, NAAF and Ninth Air Force flew almost 1,000 sorties between June 18 and 30 against supply areas, terminal ports, and marshaling

---

<sup>65</sup> Coles, *Participation of the Ninth and Twelfth Air Forces*, 67.

<sup>66</sup> Craven and Cate, *TORCH to POINTBLANK*, 189; NAAF, *Air Intelligence Report*, No. 152, 11 April 1943, MICFILM Call no. 25220, IRIS no. 2007240, in USAF Collection, AFHRA; NAAF, *Weekly Intelligence Summaries*, No. 22, 19 April 1943, HRA Call no. 612.607, IRIS no. 242393, in USAF Collection, AFHRA, 8.

<sup>67</sup> NAAF, *Weekly Intelligence Summaries*, No. 23, 26 April 1943, HRA Call no. 612.607, IRIS no. 242393, in USAF Collection, AFHRA, 2.

<sup>68</sup> Robert C. Ehrhart, “The European Theater of Operations, 1943-1945”, in *Piercing the Fog: Intelligence and Army Air Forces Operations in World War II*, ed. John F. Kreis (Washington, DC: Air Force Historical Studies Office, 1996), 174.

yards in Sicily and along the west coast of Italy, as well as in Sardinia and Corsica.<sup>69</sup>

Information gathered through ULTRA intercepts, POW interrogations, combat intelligence, target intelligence, counterintelligence, and British 'Y'-service painted a fairly clear picture of the Axis air force in the MTO.<sup>70</sup> Intelligence analysts were also able to monitor the arrival of *Luftwaffe* aircraft in the MTO from the other fronts, and the disposition of aircraft within the theater. NAAF intelligence experts were able to depict, with considerable accuracy, the strength, disposition, units, basing, and operational routes of the German and Italian air forces in-theater, providing a substantial advantage to the NAAF planners.

ULTRA intercepts, combined with the 'Y'-service reports, allowed Allied access to damage reports of enemy airfields and enabled them to determine the effectiveness of their attacks and whether specific airfields needed to be re-attacked.<sup>71</sup> This information also proved invaluable to air interdiction operations. According to Group Capt R. H. Humphreys, senior ULTRA officer of the NAAF, "we had advanced timing of every intention and move of the German air force in Africa and Italy, and as many moves and intentions of Italian forces as fell into joint Italo-German programmes."<sup>72</sup>

### **The Role of Radar**

The heavy losses to Axis air forces during the opening days of Operation HUSKY forced the *Luftwaffe* to transition to night attacks in an effort to diminish the number of casualties.<sup>73</sup> To protect the assault

---

<sup>69</sup> Craven and Cate, *TORCH to POINTBLANK*, 435-438; Robert C. Ehrhart et al., "Building an Air Intelligence Organization", 158.

<sup>70</sup> Robert C. Ehrhart et al., "Building an Air Intelligence Organization", 161.

<sup>71</sup> Robert C. Ehrhart et al., "Building an Air Intelligence Organization", 164.

<sup>72</sup> Humphreys, "Use of 'U,'" SRH-037, 27.

<sup>73</sup> Richards, Denis, et al., *The Royal Air Force, 1939-1945, Vol. II, The Fight Avails*, 313. Malta played a decisive role in projecting Allied air superiority. Spitfires and P-40 Warhawks, on patrol over the beaches of Sicily, made daylight attacks by the *Luftwaffe* both hazardous and costly.

forces on the beaches and off the coast of Sicily, three radar GCI systems were installed on Landing Ship, Tank (LST) amphibious assault vessels supporting the invasion of southern Sicily. The LST-based GCIs, operating in concert with night fighters based on Malta, were used to support three patrol lines covering the coastal regions north and south off Syracuse, Gela, and Catania.<sup>74</sup> As a result, an estimated 83 Axis aircraft were destroyed, 22 probably destroyed, and 50 damaged by NATAF fighters.<sup>75</sup> Mobile radar units of the XII Air Support Command were put ashore in a secondary assault wave to extend the air warning coverage, while follow-up units would relieve the mobile units days later and set up permanent radar sites as docking facilities became available.<sup>76</sup>

On 12 July, as further testimony to the impact of radar and its role in achieving Allied air superiority, radar GCI units detected, identified, and directed intercepts for approximately 300 inbound enemy air sorties over the Sicilian assault areas. This timely detection ensured that no less than 150 enemy aircraft were prevented from reaching the landing zones of the amphibious assaults. Of the 89 radar plots identified over the assault, 26 were intercepted prior to reaching the beaches, and the remaining 63 were engaged by fighters on combat patrols.<sup>77</sup>

In one of the more innovative uses of radar, a novel radar interrogation technique was introduced during the assault on Sicily to facilitate night landings of airborne troops behind enemy lines. The system consisted of portable interrogation radar units, code-named Rebecca, and beacons, code-named Eureka. Eureka, only responding to

---

<sup>74</sup> Brigadier C.J.C. Molony, et al., *The Mediterranean and Middle East, Volume V: The Campaign in Sicily 1943 and the Campaign in Italy* (London: Her Majesty's Stationery Office, 1973), 33; Coles, *Participation of the Ninth and Twelfth Air Forces*, 110.

<sup>75</sup> "Report on Operation by the Northwest African Tactical Air Force in the Capture of Sicily", 8, cited in Coles, *Participation of the Ninth and Twelfth Air Forces*, 111.

<sup>76</sup> Twelfth Air Force in the Sicilian Campaign, Annex 22 Operation HUSKY Signal Plan, XII Air Support Command, HRA Call no. 650.01-2, IRIS no. 245129, in USAF Collection, AFHRA.

<sup>77</sup> "Action Report of Western Naval Task Force in the Sicilian Campaign", cited in Coles, *Participation of the Ninth and Twelfth Air Forces*, 106.

signals transmitted by Rebecca, was operationally employed by strapping it “to the leg of its parachute-borne carrier” who would land in advance of the main force and set up at the drop zone. Rebecca, installed on any air transport or glider, would transmit a radar interrogation signal, and Eureka would respond by providing range and bearing to the landing zone. The reported success of the system in Sicily ensured that it would have a role in the airborne landings of Normandy in 1944.<sup>78</sup> In his autobiography, radar pioneer Robert Watson-Watt quotes historian Henry Guerlac: “the development . . . of portable and airborne beacons . . . [was] used on a limited scale in the radar control of tactical aircraft in support of ground troops. But their most dramatic service was in precision control of parachute drops and airborne operations.”<sup>79</sup>

### **The Beginning of the End**

At the outset of the invasion of Sicily, the *Luftwaffe* averaged between 275-300 daily sorties between 10 and 12 July; in the days following, however, the average had deteriorated to around 150 sorties per day. The loss of the German coastal radar stations, destroyed by the pre-invasion preparation attacks by Allied air forces, as well as the loss of other vital installations on D-Day, left the *Luftwaffe* essentially blind to Allied fighters.<sup>80</sup>

The first four days of the air campaign had eliminated an estimated 151 aircraft, of which 91 were destroyed and 43 damaged in aerial combat.<sup>81</sup> The result of the combined efforts of the Mediterranean Air Command “was a reduction of enemy air resistance, [with 13 July] being the last day on which [the enemy] was able to put up any effective

---

<sup>78</sup> Watson-Watt, Robert, *The Pulse of Radar: The Autobiography of Robert Watson-Watt* (New York: Dial Press, 1959), 146-147, 332-334.

<sup>79</sup> Watson-Watt, Robert, *Pulse of Radar*, 334.

<sup>80</sup> “Report of the Northwestern African Air Forces”, 4 cited in Coles, *Participation of the Ninth and Twelfth Air Forces*, 113-114.

<sup>81</sup> RAF Narrative (First Draft), *The Sicilian Campaign*, 62.

opposition in Sicily.”<sup>82</sup> By 16 July, the height of withdrawal of Axis air forces from Sicily, the *Luftwaffe* air strength consisted of 120 aircraft. On 18 July that number had declined to 25 serviceable aircraft, and by 22 July, any aircraft that was able to depart the island had done so.<sup>83</sup> In the words of Colonel Bogislaw von Bonin, Commander of XIV *Panzer Korps* in Sicily, the “Allied air forces had complete mastery of the air [and] the Axis air force ceased to exist . . . the battle in Sicily would have to be fought without any air support”<sup>84</sup> As Allied ground task forces advanced and captured airfields, aircraft flying from airfields in North Africa and Malta displaced to airfields in Sicily. The first to move to Sicily were the fighters operating from the island airfields. At the same time, the fighter-bombers operating from airfields in Tunisia backfilled the island airfields. As more airfields were captured on Sicily, the fighter-bombers moved to Sicily, and in turn, light bombers occupied the island airfields.<sup>85</sup> On 16 August, the Axis forces surrendered Messina. Day and night patrols in the Messina straits were conducted against the Axis forces retreating to Italy, but by this time air superiority had been ceded to the Allied Air Force and the Allied forces had achieved a primary objective of the Mediterranean strategy—the surrender and elimination of Italy from the war on 3 September 1943.

---

<sup>82</sup> “Report of the Northwestern African Air Forces”, 4 cited in Coles, *Participation of the Ninth and Twelfth Air Forces*, 113-114.

<sup>83</sup> RAF Narrative (First Draft), *The Sicilian Campaign*, 63.

<sup>84</sup> Colonel Bogislaw von Bonin, “Battle for Sicily”, February 1947 cited in RAF Narrative (First Draft), *The Sicilian Campaign*, 68.

<sup>85</sup> RAF Narrative (First Draft), *The Sicilian Campaign*, 27.



## **Chapter 4**

### **Analysis**

The maturation of the Allied air forces in North Africa and the subsequent implementation of the lessons learned in the invasion of Sicily provide several key concepts for consideration with regards to the achievement of air superiority. Operation TORCH was the first major instance of combined Allied operations in World War II. The Allied air forces were not adequately prepared doctrinally or materially to use air power in a manner that would achieve immediate air superiority and subsequently support ground and amphibious operations. The Allied forces were fortunate that the invasion of North Africa on 8-11 November 1942 was met with minimal resistance and by a force that was equally unprepared for war. A very different situation, however, existed in Tunisia as the Allied air forces confronted the battle tested *Luftwaffe*, which had recently redeployed from Russia and Norway.

Technological innovations such as radar, developed in the pre-war years and refined in the Mediterranean in the Second World War, would afford Allied air forces with tactical early warning of adversary air advances, as well as the ability to direct fighters to intercept Axis aircraft. Through a collaboration of tactical signals intelligence, strategic-level ULTRA intercepts, photographic reconnaissance, and imagery interpretation, air planners were afforded the critical information necessary to mass forces at decisive points and thereby attain air superiority. Lessons from World War I, however, led to an understanding that technological superiority was just one factor leading to air superiority. With regards to the air situation in the Mediterranean, Richard Davis writes, "If superiority had rested simply in numbers of machines, the Allies would have had it throughout the campaign. Mere numbers, however, were decisive only if all other factors—training, logistics, organization, doctrine, weapons and geographic position, as



well as morale, combat experience, and condition of available manpower—were equal.”<sup>1</sup> The focus of this chapter is to analyze the technology, organization, and doctrine employed in the Mediterranean in order to understand what role they played in gaining and maintaining air superiority in this theater.

### **Operation TORCH: Ill-prepared Allied Air Forces**

One analysis of the fight for air superiority in the Mediterranean contends that the victor would be the “side that could produce the most trained aircrews and modern aircraft, as well as other weapons such as radar”—stressing the importance of quality and quantity of aircraft and airmen as the determining arbitrators for air superiority.<sup>2</sup> A comparison of the number of aircraft employed by the air combatants in Operation TORCH on 12 November 1943, just four days after the Allied invasion of North Africa, illustrates that numerically, the Axis forces were only slightly inferior—1,086 Axis aircraft compared to 1,172 Allied aircraft.<sup>3</sup> At least numerically, these numbers would suggest that the combatant air forces entered the struggle for Tunisia on an equal footing.

By one historian’s account, “comparing the differences in aircraft performance [between the combatants] proves no more helpful” in understanding the determinants for air superiority.<sup>4</sup> David Syrett maintains that, while bomber-to-bomber comparisons are difficult, it is generally believed that Allied bombers were superior to their Axis counterparts. When comparing speed, climb rate and maneuverability of single-engine fighters, only the Spitfire could compete against the likes of

---

<sup>1</sup> Richard G. Davis, *Carl A. Spaatz and the Air War in Europe* (Center of Air Force History: Washington, DC, 1993), 119.

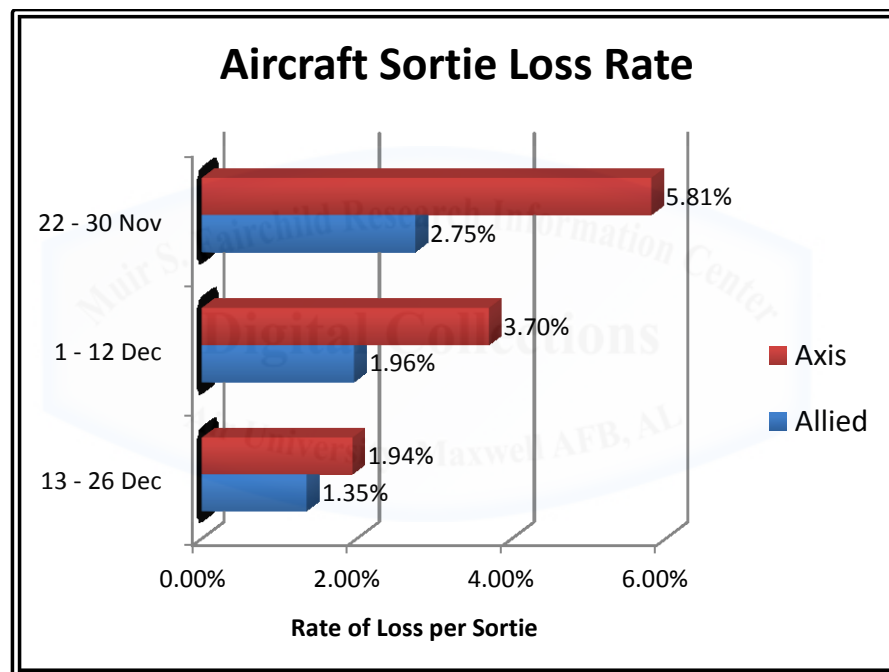
<sup>2</sup> David Syrett, “North Africa, 1942-1943”, in *Case Studies in the Achievement of Air Superiority*, ed. Benjamin F. Cooling (Washington, DC: Air Force History & Museums Program, 1994), 256.

<sup>3</sup> These numbers were compiled from various resources to include F.H. Hinsley, et al., *British Intelligence in the Second World War: Its Influence on Strategy and Operations*, Vol. II (New York: Cambridge University Press, 1981), 487-488; I.S.O Playfair, et al., *The Mediterranean and the Middle East, Vol. IV: The Destruction of the Axis Forces in Africa* (London: HMSO, 1966), 171; History of the Twelfth Air Force, Vol. I (Draft), HRA no. 650.057-3, IRIS no. 245172, in USAF Collection, AFHRA, 19;

<sup>4</sup> Syrett, “North Africa, 1942-1943”, 256.

the Fw 190 or the Me 109. The Allied air forces did, however, have the superior twin-engine fighter, the P-38, as compared to the German Me 110.

Another indicator of effectiveness of the respective air forces can be illustrated by comparing the combined loss rate of Allied air forces to that of the *Luftwaffe* in Operation TORCH from the beginning of the Tunisian Campaign to the end of the winter campaign (22 November – 26 December 1942). During this timeframe the Axis air forces suffered from nearly twice the attrition rate as the Allied air forces (Figure 5).<sup>5</sup>



**Figure 3. Comparison of Sortie Loss Rate (22 Nov – 26 Dec 1942)**

Source: Chart is author's original work derived from I.S.O. Playfair, et al., *The Mediterranean and the Middle East, Vol. IV: The Destruction of the Axis Forces in Africa* (London: HMSO, 1966), 179-189.

relative freedom of action than the Axis air forces in the Tunisian Campaign. So why were the Axis air forces able to maintain an advantage over the Allied air forces in Operation TORCH; and more specifically in the Tunisian Campaign?

<sup>5</sup> I.S.O. Playfair, et al., *The Mediterranean and the Middle East, Vol. IV: The Destruction of the Axis Forces in Africa* (London: HMSO, 1966), 179-189.

One of the leading impediments to Allied forces achieving air superiority over the Axis in Tunisia can be attributed to the improper organization of Allied air forces. The Allied air forces in TORCH were organized as two separate forces, each assigned distinct missions supporting disparate goals. The inherent weakness in the division of air forces prevented the Allies from massing forces against the Axis stronghold or center of gravity in Tunisia.<sup>6</sup> This division of air forces violated Clausewitz's dictum on concentration of forces against the enemy's center of gravity. He wrote that, "A major battle in a theater of operations is a collision between two centers of gravity; the more forces we can concentrate in our center of gravity, the more certain and massive the effect. Consequently, any partial use of force not directed toward an objective that either cannot be attained by the victory itself or that does not bring about the victory should be *condemned*."<sup>7</sup> (emphasis in original) Field Marshal Albert Kesselring even noted that "as long as the [Allied] armies were still fighting on separate fronts" the *Luftwaffe* was able to provide satisfactory air support to the German ground forces.<sup>8</sup>

Allied air forces, however, struggled in employing air power doctrine and command and control as defined in Field Manual 31-35, *Aviation in Support of Ground Forces*. Under this guidance air forces were employed as "air umbrellas" to support the ground commanders; thereby decentralizing the command and control of Allied air forces. The priority of the air forces was on "ground targets in support of ground forces"<sup>9</sup> instead of eliminating enemy air forces in the air and on the ground. Therefore, Allied air forces were not able to secure the air over the

---

<sup>6</sup> Albert M. Kesselring, *A Soldier's Record* (New York: William Morrow & Company, 1954), 175, 182. In his memoirs, Field Marshal Albert Kesselring inferred that the inability of the Allied air forces to achieve air superiority in Tunisia was a direct result of their faulty organization. He noted that there were "no signs of operational coordination in the air" on part of the Allied air forces.

<sup>7</sup> Carl von Clausewitz, *On War*, trans. and ed. Michael Howard and Peter Paret (Princeton, NJ: Princeton University Press, 1984), 489.

<sup>8</sup> Kesselring, *Soldiers Record*, 186.

<sup>9</sup> Syrett, "North Africa, 1942-1943", 226.

battlefield, and Allied ground forces had no other recourse but to go on the defensive. When Allied forces were halted just short of Tunisia in late December, “Allied air had not gained air superiority or established effective air support arrangements.”<sup>10</sup> This would continue to be the case until the early spring of 1943 when the Allied air forces held a 2 to 1 advantage in resources over the Axis air forces in Tunisia.<sup>11</sup>

The halt of the ground offensive in December 1942 allowed Allied air commanders a brief respite to reorganize and codify air power principles; specifically the importance of centralized control of air assets. The turning point for the effective application of air power on the part of the Allied air forces was in February 1943, following the reorganization and redistribution of air assets that led to a combined Mediterranean Air Command. The newly appointed air commanders now “used their air resources in a coherent campaign to gain air superiority in the Mediterranean.”<sup>12</sup> Air Marshal Coningham’s air control system—developed while leading the Western Desert Air Force—would have a significant impact on Allied air operations. As Commander, Northwest African Tactical Air Force, he rectified the faulty doctrine of piecemeal employment of air forces. No longer were air forces assigned to “air umbrella” taskings in direct support of the ground commanders, but, under Coningham’s system, the Allied air “strategy aimed at supporting the overall theater objective of destroying Axis forces in Tunisia [and Sicily] rather than a more cavalier ‘independent’ air strategy.”<sup>13</sup>

A secondary reason for the Allied air forces’ inability to achieve air superiority in Tunisia was directly attributable to the lack of suitable airfields. Geographically constrained allied air forces were limited by both the availability of and access to all-weather airfields. The small number of airfields and the lack of logistical support limited the number

---

<sup>10</sup> Davis, *Carl A. Spaatz and the Air War in Europe*, 145;

<sup>11</sup> History of the Twelfth Air Force, Vol I. (Draft), Ch. 10, 28.

<sup>12</sup> Williamson Murray, *Luftwaffe* (Baltimore, MD: The Nautical & Aviation Publishing, Co., 1985), 157.

<sup>13</sup> Murray, *Luftwaffe*, 157.

of Allied aircraft in the forward combat area. The lack of intelligence, specifically in access to photo reconnaissance of the North African topography, resulted in Allied air forces being based at substandard airfields, hundreds of miles from the front lines, and being held captive to the intricacies of the desert weather. In contrast, the inclement weather that plagued the Allied forces and crippled airfield operations did not have the same effect on Axis forces operating from airfields in Bizerte and Tunis. The Axis forces held prime, all-weather airfields in Tunisia, as well as airfields in Sicily and Sardinia, from which to operate.

In contrast to the heavy use of Allied bombers and fighter-bombers in Tunisia, the German Air Force made no effort or had no reason to establish a bomber force in Tunisia. Instead, the *Luftwaffe* employed the venerable Ju 87 dive bomber from Sicily and Sardinia. This platform, the scourge of the Allied ground forces, along with the introduction of the German Focke-Wulf 190, positioned the *Luftwaffe* “to maintain equality with the numerically superior Allied air forces.”<sup>14</sup>

The Axis momentum in the Tunisian Campaign dissipated with retreat of Field Marshal Erwin Rommel’s forces in the Kasserine Pass in February 1943, as the impact of Air Marshal Coningham’s revision to air power doctrine took hold. To the benefit of the Allied Air Force, ground forces captured valuable forward operating air bases in the early spring of 1943, and the Axis stranglehold on Tunisia was being methodically removed. In the words of the Commander-in-Chief of the Mediterranean Theater of Operations, General Eisenhower, “From the close of the Kasserine battle our position steadily improved . . . [due in part to] the steadily growing strength and efficiency of our air forces, and the construction of suitable operating fields and bases.”<sup>15</sup>

## **Technological Refinement**

---

<sup>14</sup> H.A. Probert, *The Rise and Fall of the German Air Force, 1933-1945* (London: Arms & Armour, 1987), 149.

<sup>15</sup> Dwight D. Eisenhower, *Crusade in Europe* (Garden City, NY: Doubleday & Company, 1948), 148-149.

## *Intelligence*

The importance of signals intelligence cannot be stated too highly. Signals intelligence (SIGINT), specifically the ‘Y’ intercepts, provided real-time assessment of the flow of the air battle by identifying the most likely locations of primary fighter bases, fighter control locations, air defense organization, and fighter areas of responsibilities.<sup>16</sup> SIGINT, both ‘Y’-service and ULTRA, combined with photo reconnaissance, permitted air planners to gain a holistic view of the Mediterranean. It provided commanders with situational awareness—or the understanding of how accurately “one’s perception of the current environment mirror[ed] reality” in the Mediterranean.<sup>17</sup> The successful exploitation of intelligence during Operation TORCH served to convert senior leaders “from ignorance of and contempt for intelligence to a lively appreciation of its usefulness in shaping operations and strategy.”<sup>18</sup>

The analysis derived from the use of intelligence tools was “the most effective means to achieve air supremacy”<sup>19</sup> in that it supported the air power strategy of concentrating offensive strikes against Axis assets in the air and on the ground. Air planners, utilizing the tools of intelligence, were able effectively to mass air forces to reduce the enemy lines of communication into Tunisia and deny supplies and reinforcements to Axis forces in North Africa.

The Achilles heel of Axis operations in Tunisia was the supply lines from Sicily. The Allied forces leveraged technology to halt the movement of supplies to the German front lines. These losses only tended to

---

<sup>16</sup> Alexander S. Cochran, Jr., Robert C. Ehrhart, and John F. Kreis, “The Tools of Air Intelligence: ULTRA, MAGIC, Photographic Assessment, and the Y–Service” in *Piercing the Fog: Intelligence and Army Air Forces Operations in World War II*, ed. John F. Kreis (Washington, DC: Air Force Historical Studies Office, 1996), 96.

<sup>17</sup> Milan N. Vego, “Systems Versus Classical Approach to Warfare”, *Joint Forces Quarterly*, Issue 52, 1st Quarter 2009, 40-48: 44.

<sup>18</sup> Ralph Bennett, *Behind the Battle: Intelligence in the War with Germany* (London: Pimlico, 1999), 132.

<sup>19</sup> Robert C. Ehrhart, Thomas A. Fabyanic, and Robert F. Futrell, “Building an Air Intelligence Organization and the European Theater”, in *Piercing the Fog: Intelligence and Army Air Forces Operations in World War II*, ed. John F. Kreis (Washington, DC: Air Force Historical Studies Office, 1996), 167-168.



exasperate an already dire sortie attrition rate. The crippling anti-shipping attacks forced the German high command to resort to desperate measures and employ air transport to meet the supply needs of its forces in Tunisia.<sup>20</sup> In a 10-day span in April 1943, supported by photo reconnaissance, signals intelligence, and early warning radar, the Allied air forces located and decimated the *Luftwaffe* air transport infrastructure—destroying 141 Ju 52s off the coast of Cap Bon, Tunisia.<sup>21</sup>

Not only was the *Luftwaffe* being dismantled in the air above Tunisia, but it was also becoming combat ineffective as a result of repeated air attacks on its Tunisian airfields. Damage reports, supported by intelligence, (ULTRA and 'Y' intercepts) provided Allied air commanders with the analysis necessary to determine the combat effectiveness of Allied attacks on enemy air fields. This information led not only to a full understanding of the accuracy of the air attacks, but also guided decisions for when and where to repeat these attacks.

### *Radar*

Radar capabilities in the Mediterranean suffered a number of early setbacks. The *Luftwaffe* was nearly uncontested in Algiers in November 1942 due to the lack of Allied aerial interception equipment and ground control intercept radar. In the rush to employ as many aircraft as possible on the Algerian front, the Allied air forces neglected to send forward ground-based early warning radar.<sup>22</sup> As a result, Allied fighters were unable to intercept and prevent *Luftwaffe* attacks. Air commanders, for both safety and security reasons, were forced to concede the use of airfields for heavy bombers in Algiers. The resultant

---

<sup>20</sup> Bennett, *Behind the Battle*, 131.

<sup>21</sup> NAAF, *Weekly Intelligence Summaries*, No. 22, 19 April 1943 and No. 23, 26 April 1943, HRA Call no. 612.607, IRIS no. 242393, in USAF Collection, AFHRA.

<sup>22</sup> Richard G. Davis, *Carl A. Spaatz and the Air War in Europe* (Center for Air Force History, 1996), 186



effect was increased flight time to the battlefield and limited range and duration over enemy held territory.

General Spaatz, understanding the “importance and urgency of radar coverage at the front in obtaining effective use of fighters on both the defensive and the offensive,”<sup>23</sup> wrote to General Arnold in a letter dated 7 March 1943, “The ability of the enemy to attack our troops with dive bombers indicates that the enemy has control of the air or our forces are improperly controlled or that essential equipment is lacking. The solution lies in the acceptance of the principle that the first prerequisite to the support to the ground army or armies is the establishment of a fighter defense and offense, including [radar direction finders, ground control intercept], and other types of Radar equipment essential for the detection of enemy aircraft.”<sup>24</sup>

With the introduction of American microwave radars, ground control intercept (GCI) equipment, and aircraft equipped with aerial interdiction (AI) radar, ground controllers could detect aircraft attempting to skirt beneath radar coverage. Faced now with an increasing loss of *Luftwaffe* pilots and aircraft, the German Air Force learned to avoid areas that employed the deadly GCI-AI equipment. In addition to the intercept mission, radar systems increased the effectiveness of command and control of Allied air forces. Intelligence gained from radar systems informed decisions on the efficient use of air resources and increased the flexibility in the allocation of limited resources. There is little doubt that radar transformed the air war, if only to increase the effectiveness of the fighter and bomber forces in the interdiction of German supplies from Sicily into Tunisia.

### **Axis Culmination Point in Tunisia**

---

<sup>23</sup> Davis, *Carl A. Spaatz and the Air War in Europe*, 186.

<sup>24</sup> Letter, Spaatz to Arnold, Marc 7, 1943, Spaatz Papers, Diary cited in Davis, *Carl A. Spaatz and the Air War in Europe*, 187.

As April turned to May, the Axis air forces were only able to field a meager resistance against the now overwhelming Allied air superiority. As the battlefield contracted, the *Luftwaffe* was compelled to protect its diminishing resources by ceding air superiority and retreating to Sicily—the Axis air forces had reached a culmination point. The Allies, in the words of Field Marshal Kesselring, had “won a total victory . . . in Tunisia and North Africa” and with this victory the Allies had gained freedom of movement in the Mediterranean and demonstrated the versatility and flexibility of air power.<sup>25</sup>

### **Operation HUSKY: A Position of Strength**

The Allied Air Forces gleaned significant lessons from their operations in Tunisia that were carried into the planning for Operation HUSKY. The first priority for this advance was the destruction or neutralization of enemy air forces. When air planners set out to define the objectives for Operation HUSKY, they were operating from a position of strength with nearly 5,000 operational aircraft at their disposal. Unsure of the Allied forces’ next objective, the Germans hedged their bets and dispersed the 1,500 – 1,600 available aircraft across the Mediterranean, primarily within Sicily and Italy. As evidenced by the limited engagement by Axis air forces, an analysis of the determinants of air superiority in Operation HUSKY is difficult to conduct.

The overwhelming destruction of Axis airfields on Pantelleria and the islands of Lampedusa, Linosa, and Lampione was heralded as “one of the principal contributions of the air forces in the ultimate victory of Sicily”<sup>26</sup> and “marked the first successful Allied effort to conquer enemy territory principally by air action.”<sup>27</sup> This operation is an illustration of the versatility, flexibility, and decisive use of air power in the Mediterranean. Again, this claim brings with it the caveat that at this

---

<sup>25</sup> Kesselring, *Soldiers Record*, 188-189.

<sup>26</sup> Coles, *Participation of the Ninth and Twelfth Air Forces*, 41.

<sup>27</sup> Matloff, *Strategic Planning for Coalition Warfare: 1943-1944*, 150.

point in the battle for the Mediterranean there was minimal Axis fighter resistance. By the start of Operation HUSKY, the Allied air forces had achieved air superiority by the mere fact that any Axis aircraft encountered over Sicily and Sardinia refused to engage, or if they did, attacked in minimal strength.

## **Technology Exploited**

### *Intelligence*

Operation TORCH was a testing ground not only for the employment of air power, but it was also a period of maturation for the methods, procedures, and processes for the collection and timely dissemination of intelligence. The various intelligence tools and the exploitation of the information were fine tuned in Operation TORCH and translated to the planning and execution of Operation HUSKY.

Information gathered through ULTRA intercepts and other SIGINT sources, as well as through interrogations, helped define the operational environment for HUSKY. The analysis of this information, upon which intelligence was derived, painted a fairly clear picture of the Axis air forces in the Mediterranean and permitted intelligence experts to depict, with considerable accuracy, the strength, disposition, units, basing, and operational routes of the German and Italian air forces in-theater. This information provided a substantial advantage to the NAAF planners.

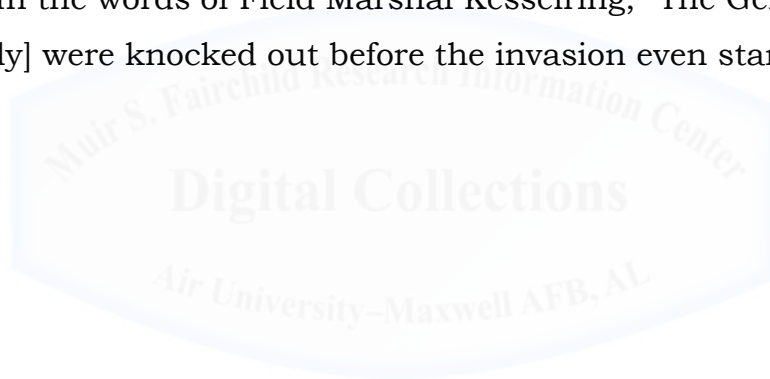
### *Radar*

Air operations in Operation HUSKY capitalized on the ability to utilize Malta as a secure base of operations. Along with the airfields, Malta was reinforced with radar stations to increase the defense coverage and offensive aerial interdiction of any Axis aircraft that chose to engage. Radar played a significant role in maintaining air superiority over the beaches of Sicily. Malta-based fighters, supported by sea-borne GCI, not

only protected the amphibious assault force, but limited and even prevented Axis air interference with land-based operations.

### **Diminishing Returns**

From 13 May 1943, when the Axis forces surrendered Tunisia, and throughout the Sicilian Campaign, the Allied Air Force had achieved not only air superiority, but air supremacy. The failure of the Axis forces to project any semblance of effectiveness in the defense of Pantelleria and Sicily can be attributed to the fact that the *Luftwaffe*, at this point in the conflict, was “a factor of diminishing importance.”<sup>28</sup> The role of the *Luftwaffe* in the defense of these islands was, for all intents and purposes, irrelevant, and by late July the Axis air force ceased to exist on Sicily. In the words of Field Marshal Kesselring, “The German Air Forces on [Sicily] were knocked out before the invasion even started.”<sup>29</sup>



---

<sup>28</sup> Kesselring, *Soldiers Record*, 189.

<sup>29</sup> Kesselring, *Soldiers Record*, 194.

## Chapter 5

### Conclusion and Implications

*Only the United States . . . has engaged in a single minded and successful quest for air superiority in every conflict it has fought since World War I. . . . it is the distinctively American form of military intimidation.*

— Eliot A. Cohen,  
“The Mystique of U.S. Air Power”,  
*Foreign Affairs*

The nuances of the Mediterranean theater cross all levels of war—strategic, operational, and tactical. The British intuitively understood the military and economic implications at the strategic level of war. The security of this vital region had political implications with regards to the viability of the Lease-Lease program, the timely delivery of supplies to the Russian front, and to stemming the Japanese advance in the Pacific. At the operational level, a secure Mediterranean ensured access to the Suez Canal and the oil routes from the Middle East.

American planners were not persuaded by the British argument for opening a front in the Mediterranean, believing that it was a misuse of resources and a frivolous expense of time and initiative. Roosevelt, overruling his senior military advisors, was convinced that “strategically the British, and ultimately the Americans, had little to lose by fighting [in the Mediterranean], and much to gain.”<sup>1</sup> Not only was the Mediterranean a theater where America could make its presence known immediately, but confronting the Axis forces in North Africa would have the strategic and operational benefit of depleting critical German resources that would otherwise be employed against Allied forces on the continent.

---

<sup>1</sup> Douglas Porch, *The Path to Victory: the Mediterranean Theater in World War II* (New York: Farrar, Straus and Giroux, 2004), 7.

For Adolf Hitler and the German high command, the Mediterranean was a backwater conflict that they were reluctantly drawn into by their Italian ally. It was not until the assault by the Allied forces on the beaches of North Africa that the Germans begin to give any serious thought to this region. In the fall of 1942, the campaign for air superiority in North Africa would begin to draw critical German resources from Russia, while at the same test the fortitude of a relatively inexperienced Allied coalition. The years of fighting in the Mediterranean Theater had “shorn [the German war machine] of offensive capability, reducing it to defensive campaigns” in Sicily and later in the mountains of Italy and the Balkans.<sup>2</sup>

As the Allied air forces were to discover in Tunisia, “There is nothing absolute about air superiority—so long as the enemy can operate any aircraft.”<sup>3</sup> The expectation that the Allied air forces would be able to achieve complete air superiority in North Africa was a tall order, especially considering the status of this ill-prepared air force, cobbled together from aviation units with little-to-no combat experience.

The race for Tunisia revealed the weaknesses of the initial air plan for Operation TORCH. The Allied command structure put in place for Operation TORCH, compounded by the logistical disadvantages of substandard Allied airfields, resulted in the inability of the Allies to employ the *full force* of their numerically superior air assets against the Axis forces. The implementation of separate task forces each with their own assigned air forces conducting independent operations led to an uncoordinated air effort in providing theater support. The fragmentation of available air assets and the gross misuse of Allied airpower as employed in accordance with Field Manual 31-35, *Aviation in Support of*

---

<sup>2</sup> Porch, *Path to Victory*, x.

<sup>3</sup> Arthur W. Tedder, *Air Power in War*, paperback ed. (Tuscaloosa: University Alabama Press, 2010), 39.

*Ground Forces*, enabled the numerically inferior *Luftwaffe* to secure *de facto* air superiority over Allied air forces.<sup>4</sup>

The reorganization of the Allied air forces under a single air commander in February 1943 led to the incorporation of the principles of unity of command and flexibility of action into their doctrine—a doctrine that had been effectively exercised by the Western Desert Air Force. With Air Marshal Tedder aboard, the Allied Air Force now had “an Airman with the experience and knowledge of how to best use airpower’s flexibility and offensive capability and, simultaneously, the authority to command all air forces.”<sup>5</sup> This doctrine was codified in FM 100-20, *Command and Employment of Air Power*, which not only instituted parity between ground and air commanders, but also set the precedent for future air operations in the Mediterranean and on the European continent. The Allied Air Force now possessed “doctrine [that] was not based on theories without practical experience.”<sup>6</sup> Following the war, Sir Arthur Tedder counseled future air forces on the value of centralized control and the single air commander. He maintained that centralized control permits flexibility in the execution of air power and “brings with it an immense power of concentration which is unequalled in any other form of warfare.”<sup>7</sup>

The full effectiveness of the command and control of Allied air forces was realized with the integration of radar into the air command system. While it is apparent that radar increased the effectiveness of air power as a defensive weapon, this technology was without doubt a force multiplier as an offensive capability. Coupling radar with intelligence sources such

---

<sup>4</sup> Robert C. Ehrhart, Thomas A. Fabyanic, and Robert F. Futrell, “Building an Air Intelligence Organization and the European Theater”, in *Piercing the Fog: Intelligence and Army Air Forces Operations in World War II*, ed. John F. Kreis (Washington, DC: Air Force Historical Studies Office, 1996), 160.

<sup>5</sup> Michael W. Kometer, *Command in Air War: Centralized Versus Decentralized Control of Combat Airpower* (Montgomery, AL: Air University Press, 2007), 46.

<sup>6</sup> Brad William Gladman, *Intelligence and Anglo-American Air Support in World War Two: The Western Desert and Tunisia, 1940-1943* (New York: Palgrave Macmillan, 2009), 181.

<sup>7</sup> Tedder, *Air Power in War*, 89.



as ULTRA and 'Y'-service, air planners were now able to employ principles of mass and concentration to halt the flow of supplies and reinforcements to Axis forces in North Africa, thereby crippling the Axis air forces and forcing them on the defensive.

The experiences gained by the Allied forces in the invasion of North Africa, later employed in the operation against Sicily, were instrumental in the successful invasion of Normandy in June 1944. "Overlord was rehearsed in North Africa, Sicily, and Italy. . . . the Mediterranean had worn down and ultimately dismembered the Axis."<sup>8</sup> Without the valuable experience of conducting an amphibious landing on a hostile shore, coupled with the experiences in Tunisia that led to near absolute air superiority over Sicily, the results of Operation OVERLORD might have had a different ending; certainly if such an operation had been conducted as originally conceived in 1942.

The impetus for this study was Richard Overy's claim that air superiority in the Mediterranean was achieved through the employment of radar and intelligence. This study has shown that there is merit to this claim, yet with one critical caveat. Although radar and intelligence did serve as an enabler of air power to support Allied strategy and operational plans, the centralization of air assets was the essential contributor to the achievement of air superiority in the Mediterranean. Without this factor, it is unlikely that radar and intelligence would have had the same influence. While there is certainly anecdotal evidence to suggest that the technology of radar and the exploitation of intelligence were certainly determinants of Allied air superiority in the theater, it is debatable whether their employment unequivocally achieved air superiority in the Mediterranean. With the centralization of air power in 1943, planners and senior air leaders, aided by technology, were able to make informed decisions on the proper allocation of a resource-

---

<sup>8</sup> Porch, *Path to Victory*, xiii.

constrained air force, thus achieving and maintaining air superiority in the Mediterranean.

Recently, as North Africa and the Middle East increasingly become more chaotic following the backlash of the Arab Spring, a number of unsettled conflicts in Syria, Libya, and Egypt portend larger strategic considerations for the effective application of air power in the Mediterranean. Coalition and joint air forces commanders should consider the operational, economic, and even political costs that may be associated with future basing in this strategic location. The times may have changed, but the issues—and the geography--remain the same.

In the most recent conflict in Libya in 2011, the Combined Forces Air Component Commander (CFACC), for Operation UNIFIED PROTECTOR, noted that in the build up to the implementation and execution of the No Fly Zone (NFZ), one of his immediate concerns was with the basing of coalition aircraft. Nearly 68 years after Operation TORCH, the issues of airfield location and ramp space continue to plague the air component commander responsible for air refueling, command and control, fighters, and reconnaissance aircraft bed down. The North Atlantic Treaty Organization (NATO) forces, with access to a scant dozen airfields from Great Britain to Cyprus, had to rely on the Air Operation Center and air crews to deconflict sortie durations and air refueling on-station times in order to support the various airframes involved in enforcing the NFZ.<sup>9</sup> Operations in the Mediterranean will need to rely on the relationships and coordination of our NATO partners for airfield access. Political and economic considerations may inhibit such access in the future.

With the tendency for the United States to utilize air power as the leading element of military power, operational planners must consider future basing options in this region for what could soon be a low density,

---

<sup>9</sup> “Operation Unified Protector Mission Brief”, presented 29 February 2012, School of Advanced Air and Space Studies.

high demand Air Force. As Eliot Cohen writes, “Reliance on air power has set the American way of war apart from all others for well over half a century. . . . Only the United States . . . has engaged in a single minded and successful quest for air superiority in every conflict it has fought since World War I. . . . it is the distinctively American form of military intimidation.”<sup>10</sup> Operations in Bosnia, the containment of Saddam Hussein in the 1990s, operations in Kosovo, and the most recent NFZ in Libya, serve as historical examples how our nation’s leaders have used air power to apply force in “situations that were short of war. . . . These cases [were] characterized by short, quick applications of airpower to effect a short-term change in behavior of the opponent versus long-term strategies to accomplish strategic objectives.”<sup>11</sup>

The defense strategy document *Sustaining U.S. Global Leadership: Priorities for 21st Century Defense*, dated January 5, 2012, portends a prolonged involvement by the United States in shaping the future of the Middle East and North Africa. This document rightly asserts that this region “presents both strategic opportunities and challenges. Regime changes, as well as tensions within and among states under pressure to reform, introduce uncertainty for the future. . . . [and] *the United States will continue to place a premium on U.S. and allied military presence in—and support of—partner nations in and around this region.*”<sup>12</sup> Additional challenges will be incurred that the reduction of resources to meet the budgetary constraints. It will “require innovative and creative solutions to maintain our support for allied and partner interoperability and building partner capacity. . . . [but more importantly], *thoughtful choices*

---

<sup>10</sup> Eliot A. Cohen, “The Mystique of U.S. Air Power,” *Foreign Affairs*, Issue 73, no. 1 (January/February 1994): 120.

<sup>11</sup> Kometer, *Command in Air War*, 97.

<sup>12</sup> Department of Defense, “Sustaining U.S. Global Leadership: Priorities for 21st Century Defense”, 5 January 2012, 2, [http://www.defense.gov/news/Defense\\_Strategic\\_Guidance.pdf](http://www.defense.gov/news/Defense_Strategic_Guidance.pdf).

*will need to be made regarding the location and frequency of these operations.”*<sup>13</sup>

No longer can the United States military afford—politically or economically—to engage unilaterally in global operations against foes that threaten our national security and sovereignty. Coalition and joint forces have been and will continue to be the prevailing characteristic of military operations. The Mediterranean Theater of Operations offers an excellent case study in the development and application of coalition air forces—the challenges of integrating operations and doctrine, tactics, and capabilities. If nothing else, the lessons of the Mediterranean theater illustrate that air superiority is best attained by “The ability of decision makers to use doctrine creatively, to make wise use of aviation history to remain open to innovation, yet searching in criticism and brutally objective evaluation.”<sup>14</sup>



---

<sup>13</sup> Department of Defense, “Sustaining U.S. Global Leadership”, 5-6.

<sup>14</sup> I.B. Holley, Jr., “Some Concluding Insights”, in *Case Studies in the Achievement of Air Superiority*, ed. Benjamin F. Cooling (Washington, DC: Air Force History & Museums Program, 1994), 624.

## **Acronyms**

AA – Anti-Aircraft

AAF – Army Air Force

ABC – American British Conversation

AFB – Air Force Base

AFHQ – Allied Forces Headquarters

AI – Air Interceptor

AOC-in-C – Air Officer Commanding-in-Chief

ASC – Air Support Command

AWPD – Air War Plans Division

BP – Bletchley Park

CFACC - Combined Forces Air Component Commander

cm – centimeter

EAC – Eastern Air Command

FM – Field Manual

FW – Focke-Wulf

GAF – German Air Force

GCI – Ground Control Intercept

HQ - Headquarters

IAF – Italian Air Force

JU – Junker

kW – kilowatt

km – kilometer

LST – Landing Ship, Tank

MAC – Mediterranean Air Command

ME – Messerschmitt

MTO – Mediterranean Theater of Operations

m - meter

mm – millimeter

MW – megawatt

NAAF – Northwest African Air Force

NASAF - Northwest Strategic Air Force

NATAF – Northwest African Tactical Air Force

NATO – North Atlantic Treaty Organization

NFZ – No Fly Zone

POW – Prisoner of War

PPI – Plan Position Indicator

RADAR – Radio Range and Detection

RAF – Royal Air Force

RDF – Radar Direction-Finding

SCR – Signal Corp Radio

SIGINT – Signal Intelligence

SLU – Special Liaison Units

US – United States

USAF – United States Air Force

μW – microwatt

WDAF – Western Desert Air Force

## **Bibliography**

### **Academic Papers**

St. Clair, Matthew G. "The Twelfth US Air Force: Tactical and Operational Innovations in the Mediterranean Theater of Operations, 1943-1944". Maxwell AFB, AL: Air University Press, February 2007.

### **Articles**

Cohen, Eliot A. "The Mystique of U.S. Air Power," *Foreign Affairs*, Issue 73, no. 1 (January/February 1994): 109-124.

Holley, I.B. Jr., and John Terraine. "Land/Air Operations in the Mediterranean and Northwest Europe". *Air Power History*, Winter, (1991): 30-42.

Quesada, E. R. "Tactical Air Power". *Air University Quarterly Review*, Spring, (1948): 37-45.

Vego Milan N. "Systems Versus Classical Approach to Warfare", *Joint Forces Quarterly*, Issue 52, 1st Quarter (2009): 40-48.

### **Books**

Baker, Leonard, and Benjamin F. Cooling. "Developments and Lessons before World War II." in *Case Studies in the Achievement of Air Superiority* edited by Benjamin F. Cooling, 1-64. Washington, DC: Air Force History & Museums Program, 1994.

Bennett, Ralph. *Intelligence Investigations: How ULTRA Changed History*. London: Frank Cass, 1996.

\_\_\_\_\_. *Ultra and Mediterranean Strategy*. New York: William Morrow & Company, Inc., 1989.

\_\_\_\_\_. *Behind the Battle: Intelligence in the War with Germany*. London: Pimlico, 1999.

Clausewitz, Carl von. *On War*. Michael Howard and Peter Paret, eds., Princeton, NJ: Princeton University Press, 1989.



- Craven, Wesley Frank and James Lea Cate, eds. *The Army Air Forces in World War II. Volume I, Plans and Early Operations*. New York: University of Chicago Press, 1950.
- \_\_\_\_\_. *The Army Air Forces in World War II. Volume II, Europe: TORCH to POINTBLANK*. New York: University of Chicago Press, 1950.
- Brown, Louis. *A Radar History of World War II: Technical and Military Imperatives*. Washington, DC: Carnegie Institution of Washington, 1999.
- Buderi, Robert. *The Invention that Changed the World: How a Small Group of Radar Pioneers Won the Second World War and Launched a Technological Revolution*. New York: Simon & Schuster, 1998.
- Bungay, Stephen. *The Most Dangerous Enemy: A History of the Battle of Britain*. London: Aurum Press, 2009.
- Cooling, Benjamin F., ed. *Case Studies in the Achievement of Air Superiority*. Washington, DC: Office of Air Force History, 1994.
- Davis, Richard G. *Carl A. Spaatz and the Air War in Europe*. Washington, DC: Center of Air Force History, 1993.
- D'Este, Carlo. *World War II in the Mediterranean, 1942-1945*. Chapel Hill, NC: Algonquin Books of Chapel Hill, 1990.
- Ehlers, Robert S. Jr. *Targeting the Third Reich: Air Intelligence and the Allied Bombing Campaigns*. Lawrence, KA: University Press of Kansas, 2009.
- Eisenhower, David. *Crusade in Europe*. Garden City: Doubleday, 1955.
- Futrell, Robert Frank. *Ideas, Concepts, Doctrine: A History of Basic Thinking in the United States Air Force, 1907-1960*. Montgomery, AL: Air University Press, 1989.
- Gladman, Brad William. *Intelligence and Anglo-American Air Support in World War Two: The Western Desert and Tunisia, 1940-1943*. New York: Palgrave Macmillan, 2009.
- Griffith, Jr., Thomas E. *Macarthur's Airman: General George C. Kenney and the War in the Southwest Pacific*. Lawrence, KS: University Press of Kansas, 1998.

Guerlac, Henry E. *RADAR in World War II*, Vol. 8. Los Angeles: Tomash Publishers, 1987.

Hinsley, F.H., E.E. Thomas, C.F.G. Ranson, and R.C. Knight. *British Intelligence in the Second World War*, Vol. II. New York: Cambridge University Press, 1979.

Hinsley, F.H. *British Intelligence in the Second World War*, Abridged Version. New York: Cambridge University Press, 1993.

Holley, Jr., I.B. "Some Concluding Insights", in Benjamin F. Cooling, ed., *Case Studies in the Achievement of Air Superiority*. Washington, DC: Air Force History & Museums Program, 1994.

Howe, George F. *Northwest Africa: Seizing the Initiative in the West*. Washington, DC: Center Of Military History, 1993.

Infield, Glenn B. *Unarmed and Unafraid*. New York: The Macmillan Company, 1970.

Jackson, Robert. *The RAF in Action: From Flanders to the Falklands*. Poole, Dorset: Littlehampton Book Services Ltd, 1985.

Kesselring Albert M. *A Soldier's Record*. New York: William Morris & Company, 1954.

Kometer, Michael W. *Command in Air War: Centralized Versus Decentralized Control of Combat Airpower*. Montgomery, AL: Air University Press, 2007.

Kries, John F. *Piercing the Fog. Intelligence and Army Air Forces Operations in World War II*. Washington, DC: Air Force Historical Studies Office, 1996.

Mark, Eduard. *Aerial Interdiction in Three Wars*. Washington: Center for Air Force History, 1994.

MacCloskey, Monro. *TORCH and the Twelfth Air Force*. New York: Richards Rosen Press, 1971.

Matloff, Maurice. *Strategic Planning for Coalition Warfare: 1943-1944*. Washington, DC: Center of Military History, United States Army, 1991.

- Matloff, Maurice and Edwin M Snell. *Strategic Planning for Coalition Warfare: 1941-1942*. Washington, DC: Center of Military History, 1991.
- Molony, Brigadier C.J.C., Captain F. C. Flynn, Major-General H. L. Davies, and Group Captain T.P. Gleave. *The Mediterranean and Middle East, Volume V: The Campaign in Sicily 1943 and the Campaign in Italy*. London: Her Majesty's Stationery Office, 1973.
- Momyer, William W. *Airpower in Three Wars (WWII, Korea, Vietnam)*. Reprint edition. Maxwell AFB, AL: Air University Press, 2003.
- Montgomery, Bernard Law, First Viscount Montgomery of Alamein. *El Alamein to the River Sangro*. New York: E.P. Dutton & Company, Inc., 1949.
- Mortensen, Daniel R. *Pattern for Joint Operations: World War II Close Air Support, North Africa*. Washington, DC: Office of Air Force History and U.S. Army Center of Military History, 1987.
- Murray, Williamson. *Luftwaffe*. Baltimore, MD: The Nautical & Aviation Publishing, Co., 1985.
- Orange, Vincent. *Cunningham: A Biography of Air Marshall Sir Arthur Cunningham*. Washington DC: Center for Air Force History, 1992.
- Orange, Vincent, David R. Mets, Daniel R. Mortensen, and David Spires. *Airpower and Ground Armies: Essays on the Evolution of Anglo-American Air Doctrine 1940-1943*. New York: Air University Press, 2003.
- Overy, Richard J. *The Air War, 1939-1945*. Washington, DC: Potomac Books Inc., 2005.
- Porch, Douglas. *The Path to Victory: the Mediterranean Theater in World War II*. New York: Farrar, Straus and Giroux, 2004.
- Probert, H.A. with a new introduction, *The Rise and Fall of the German Air Force, 1933-1945*. London: Arms & Armour, 1987.

Putney, Diane T., ed. *ULTRA and the Army Air Forces in World War II: an Interview with Associate Justice of the U.S. Supreme Court Lewis F. Powell, Jr.*, Washington, DC: U.S. Government Printing Office, 1987.

Ratcliff R.A. *Delusions of Intelligence: Enigma, Ultra, and the End of Secure Ciphers*. New York: Cambridge University Press, 2006.

Richards, Denis, and Hilary St. G. Saunders. *The Royal Air Force: 1939-1945, Vol. II, The Fight Avails*. London: HMSO, 1954.

Russell, Edward T. and Robert M. Johnson. *Africa to the Alps: The Army Air Forces in the Mediterranean Theater*. Air Force History and Museums Program, 1999.

Slessor, J.C. *Air Power and Armies*. Tuscaloosa: University Alabama Press, 2009.

Syrett, David. "North Africa, 1942-1943." in *Case Studies in the Achievement of Air Superiority*, edited by Benjamin F. Cooling, 223-269. Washington, DC: Air Force History & Museums Program, 1994.

Tedder, Arthur W., *Air Power in War*, paperback edition. Tuscaloosa: University Alabama Press, 2010.

———. *With Prejudice: The War Memoirs of Marshal of the Royal Air Force, Lord Tedder*. London: Cassell & Company Ltd, 1966.

Thompson, George Raynor, Dixie R. Harris, Pauline M. Oakes, and Dulany Terrett. *The Signal Corps: The Test*. Washington, DC: U.S. Government Printing Office, 1978.

Watson-Watt, Robert. *The Pulse of Radar: The Autobiography of Robert Watson-Watt*. New York: Dial Press, 1959.

## Government Documents

*Army Air Forces Statistical Digest for World War II*, 1 December 1941 – 31 August 1945. Historical Research Agency (HRA) Call no. 134.11-6, Integrated Research Information System (IRIS) no. 00111991, in USAF Collection, Air Force Historical Research Agency (AFHRA).

Air War Plans Division-42 (AWPD-42), Requirements for Air Ascendancy, October 17, 1942. HRA Call no. 145.82-42, IRIS no. 118168, in USAF Collection, AFHRA.

Department of Defense, "Sustaining U.S. Global Leadership: Priorities for 21st Century Defense", 5 January 2012, [http://www.defense.gov/news/Defense\\_Strategic\\_Guidance.pdf](http://www.defense.gov/news/Defense_Strategic_Guidance.pdf), (accessed 5 January 2012).

G/C R. H. Humphreys, "The Use of 'U' in the Mediterranean and Northwest African Theatres of War, Oct 1945," in *Reports Received by U.S. War Department on the Use of ULTRA in the European Theater in World War II*, Special Research History-037. HRA Call no. 160.032-27, IRIS no. 1032654, in USAF Collection, AFHRA.

Headquarters Twelfth Air Force, Field Order 1, 15 October 1942. HRA Call no. 520.2132, IRIS no. 219497, in USAF Collection, AFHRA.

Headquarters Twelfth Air Force, Field Order 1, 15 October 1942, Annex 2. HRA Call no. 520.2132, IRIS no. 219497, in USAF Collection, AFHRA.

History. Twelfth Air Force, Volume I (Draft). 20 August 1942 – 31 August 1945. HRA Call no. 650.057-3, IRIS no. 245172, in USAF Collection, AFHRA.

\_\_\_\_\_. Twelfth Air Force in the Invasion of Northwest Africa. HRA Call no. 650.01-2, IRIS no. 245124, in USAF Collection, AFHRA.

Oral History Interview of Colonel Elliot Roosevelt, AAF, Commanding Officer, Photo Reconnaissance Wing, NAAF, 30 Jul 1943. Typed transcript, HRA Call no. 650.04-1, IRIS no. 245167, in USAF Collection, AFHRA.

Lt Col P. M. Barr, Office of AC/AS, Intelligence, HQ AAF, "Survey of Air Intelligence in North West African Theater, February 12-April 13, 1943". HRA call no. 142.0471-2, IRIS no. 115491, in USAF Collection, AFHRA.

Northwest Africa Air Forces. *Air Intelligence Report*, No. 152, 11 April 1943. MICFILM Call no. 25220, IRIS no. 2007240, in USAF Collection, AFHRA

\_\_\_\_\_. *Operational and Intelligence Summaries*, Nos. 131-141. HRA call no. 622.011, IRIS no. 200741, 1-11, July 1943, in USAF Collection, AFHRA.

\_\_\_\_\_. *Weekly Intelligence Summaries*, No. 22, 19 April 1943. HRA Call no. 612.607, IRIS no. 242393, in USAF Collection, AFHRA.

\_\_\_\_\_. *Weekly Intelligence Summaries*, No. 23, 26 April 1943. HRA Call no. 612.607, IRIS no. 242393, in USAF Collection, AFHRA.

RAF Narrative (First Draft), *The Sicilian Campaign, June-August 1943*. HRA Call no. 512.041-58, IRIS no. 895773, in USAF Collection, AFHRA.

Twelfth Air Force in the Sicilian Campaign, Annex 22 Operation HUSKY Signal Plan, XII Air Support Command. HRA Call no. 650.01-2, IRIS no. 245129, in USAF Collection, AFHRA.

### **Historical Studies**

Coles, Harry L., Jr. *Participation of the Ninth and Twelfth Air Forces in the Sicilian Campaign*, USAF Historical Study 37. Maxwell AFB, AL: USAF Historical Division, Air University, 1955, HRA no. 101-37, IRIS no. 467628, in USAF Collection, AFHRA.

## Field Manuals

War Department Basic Field Manual 1-5, *Employment of Aviation of the Army*. HRA Call no. 170.121001-5, IRIS no. 1076849, in USAF Collection, AFHRA.

\_\_\_\_\_. Field Manual 31-35, *Aviation in Support of Ground Forces*, 9 April 1942. HRA Call no. 170.121031, IRIS no. 127700, in USAF Collection, AFHRA.

\_\_\_\_\_. Field Manual 100-20, *Command and Employment of Air Power*. Washington, DC: U.S. Government Printing Office, 1944.

## Lectures

Simpson, Alfred F. "Development of Tactical Air Doctrine in the Mediterranean Theater". Lecture. Maxwell AFB, AL: Air War College, 12 February 1952, HRA Call no. K239.7165252-103, IRIS no. 918293, in USAF Collection, AFHRA.

